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## INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC, by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

## PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

## AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organized under the Air Force Materiel Command, DCS/Science Technology.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

## KEY TO READING THE DATA

The summaries consist of three indexes and the abstracts. From one of the indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

**Task Number** - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

**Monitor Number** - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

**Supplementary Note** - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

**Abstract** - A brief summary describing the research of the report.

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MAR 92 13P

PERSONAL AUTHORS: Waterhouse, Barry D.

CONTRACT NO. AFOSR-87-0138

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XC  
 TR-92-0811, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) The work described here is part of an ongoing set of studies aimed at characterizing the physiological actions and anatomical organization of the monoaminergic projection systems to the rat cerebral cortex. The underlying theme of this work is that the endogenous monoamines, norepinephrine (NE) and serotonin (5-HT), serve to modulate central neuronal responsiveness to afferent synaptic inputs and by so doing participate in the cognitive process of selective attention. Individual studies conducted during the period of support have investigated: 1) the effects of NE and 5-HT on postsynaptic membrane responses of cortical neurons (layers II/III and V) to threshold and subthreshold level stimulation of synaptic input pathways, 2) the effects of NE and 5-HT on receptive field and tuning properties of rat and cat visual cortical neurons, 3) the distribution of locus coeruleus and dorsal raphe neurons that project to principal relay sites along the visual and somatosensory pathways in rat, and 4) the actions of cocaine on response properties of central neurons. Overall, these data provide further support for the contention that the diffusely distributed monoamine systems of the mammalian brain may enhance the performance of target neuronal circuits as a function of

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changing behavioral conditions.

DESCRIPTORS: (U) \*ATTENTION, \*COGNITION, \*NOREPINEPHRINE, \*SEROTONIN, BRAIN, CATS, CEREBRAL CORTEX, CIRCUITS, COCAINE, DISTRIBUTION, FUNCTIONS, INPUT, LAYERS, MEMBRANES, NERVE CELLS, ORGANIZATIONS, RATS, RELAYS, RESPONSE, SITES, TARGETS, TUNING, ANATOMY, AMINES, ELECTROPHYSIOLOGY, RESPONSE(BIOLOGY), NEUROPHYSIOLOGY, CEREBELLUM, ELECTROPHYSIOLOGY, HYPOTHALAMUS, TOPOGRAPHY, MANUALS.

IDENTIFIERS: (U) PE01102F, WUAFOSR2312A2.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) High resolution 1.3 Micrometer Overtone Spectroscopy of HF Dimer in a Slit Jet: K sub A = 0 from 0 and K sub A = 1 from 0 Subbands of V sub ACC = 2 from 0.

OCT 92 18P

PERSONAL AUTHORS: Suhm, Martin A.; Faffell, John T., Jr.; McIlroy, Andrew; Nesbitt, David J.

CONTRACT NO. AFOSR-90-0055

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR, XC

TR-92-0873, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v87 n8 p5341-5354, 15 Oct 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Continuous wave difference frequency mixing of a single mode ND:YAG laser at 1.06 micrometer and a scanning, single mode ring dye laser (RGL) in a LiNbO3 crystal generates a novel source of widely tunable near infrared radiation in the 1.2-2.2 micrometer region. In conjunction with the high sensitivity of a pulsed slit nozzle expansion with multipass optics (0.48 m path length), this narrow band source of tunable IR light allows the high resolution study of overtone  $\nu = 2$  yields 0) spectra for a wide variety of molecular complexes with H stretching vibrations. In this paper, we report the first rotationally resolved spectra of (HF)2 in the first HF stretching overtone region. In particular, we observe Ka = 1 yield 0 and 0 yield 0 subbands for a vibrational state from one member of the  $\nu = 2$  overtone triad in (HF)2 with a band center of 7682.8228(5)cm-1. We tentatively assign this state as the hydrogen bond acceptor (i.e. free) HF stretching overtone 2vacc based on predissociation line widths and excellent agreement with predictions based on an anharmonic local mode description of (HF)2. Splittings of 0.2119(5)cm-1 (Ka' = 0) and 0.0942(3) cm-1 (Ka' = 1) due to interconversion

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tunneling are found. From the observed intensity alternation due to nuclear spin statistical weights, the overall vibrational symmetry for Ka' = 0 and 1 is unambiguously determined to be Tau vib = A+ and B+ for the lower and upper tunneling levels respectively. These A+ and B+ symmetry designations correspond to irreducible representations of the Ms4 molecular symmetry group, which allows for large amplitude motion and exchange of the identical HF subunits.

DESCRIPTORS: (U) \*SPECTRA, \*HYDROGEN FLUORIDE, A BAND, AMPLITUDE, AVAILABILITY, BONDING, CHEMICALS, CONTINUOUS WAVES, CRYSTALS, DIMERS, DYE LASERS, FREQUENCY, HIGH RESOLUTION, HIGH SENSITIVITY, HYDROGEN BONDS, INFRARED RADIATION, INTENSITY, LASERS, MICROMETERS, MIXING, MOLECULAR COMPLEXES, NEAR INFRARED RADIATION, NUCLEAR SPINS, OPTICS, RADIATION, REGIONS, REPRINTS, RESOLUTION, RINGS, SCANNING, SPECTROSCOPY, MOLECULAR VIBRATION, TUNNELING(ELECTRONICS).

IDENTIFIERS: (U) HF Dimer, High resolution, Hydrogen bonding, Overtone, Predissociation, Slit Jet, Supersonic expansion, Tunneling, Weakly bond complexes, PE81102F, Nd: YAG Lasers.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Experimental Distinction of Electric and Magnetic Transition Moments,

OSCILLATORS, REFLECTION, REPRINTS, ROTATION, SELECTION RULES(PHYSICS), STRUCTURES, SYMMETRY, TRANSITIONS, VALENCE, VELOCITY, ROTATION(CHEMICAL BONDS), ZEEMAN EFFECT, POLARIZATION.

MAY 92 3P

IDENTIFIERS: (U) PE61102F, Electron configuration, Dipole transition.

PERSONAL AUTHOR: Jonas, David M.; Aolina, Stephanl A.; Field, R. W.; Silbey, R. J.

CONTRACT NO. AFOSR-88-0082

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC  
TR-92-0869, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v96 n8  
p7189-7190, 1 May 92.

ABSTRACT: (U) Vibronic electric and magnetic dipole transitions have the same rotational structure and relative intensity patterns, so that rotational band structure cannot distinguish parallel electric and magnetic dipole transitions. The point group symmetry of parallel electric and magnetic dipoles is different under all Sn, rotation-reflection operators, so that the change in symmetry deduced from the rotational band structure on the two hypotheses may differ. Since fully allowed magnetic dipole transitions are roughly a factor of (V/C) 2 less intense than fully allowed electric dipole transitions, (where v is the speed of the charges and c is the speed of light), 2 sufficiently strong transitions (oscillator strength f > 10-5) must be electric-dipole transitions. However, Van Vleck 3 has pointed out that electric-dipole transitions between most valence states are forbidden for separated atoms since they correspond to parity forbidden transitions between atomic states with the same electron configuration, while magnetic dipole transitions between valence states are allowed in the separated atom limit.

DESCRIPTORS: (U) \*MAGNETIC DIPOLES, \*ATOMIC SPECTROSCOPY, \*DIPOLE MOMENTS, ATOMS, ELECTRONS, INTENSITY, LASERS.

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AD-A258 238 7/3

MASSACHUSETTS INST OF TECH CAMBRIDGE

COLUMBIA UNIV NEW YORK

(U) Excitation Spectra of 2-5-dihydroxy-p-benzoquinone Monomer and Hydrates.

(U) Nitroxide-Labeled Ru(II)-Polypyridyl Complexes as EPR Probes to Study Organized Systems. 2. Combined Photophysical and EPR Investigations of B-DNA.

AUG 92 7P

92 8P

PERSONAL AUTHORS: Redington, Richard L.; Redington, Theresa E.; Rajaram, Bhavani; Field, Robert W.

PERSONAL AUTHORS: Ottaviani, M. F.; Ghatlia, N. D.; Bossmann, S. H.; Barton, J. K.; Durr, H.; Turro, N. J.

CONTRACT NO. AFOSR-88-0082, AFOSR-91-0079

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B1

TASK NO. B2

MONITOR: AFOSR, XC

TR-92-0970, AFOSR

MONITOR: AFOSR, XC

TR-92-0974, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97

Availability: Pub. in Jnl. of the American Chemical Society, v114 p8948-8952 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The fluorescence excitation spectrum of the lowest allowed singlet-singlet transition of jet-cooled 2,5-dihydroxy-p-benzoquinone is reported. The transition is assigned as S sub 3 -S sub 0, and the O-O band origin is at 275.55 nm. Twenty vibrational levels, which include half of the A sub g fundamentals, are assigned for the S sub 3 state. The observed laser-induced fluorescence transitions are structureless peaks with bandwidths that depend on the intensity of the excitation laser. No spectral multiplets attributable to intramolecular tunneling were observed. Deuterium isotope shifts of the O-O transition are + 21 cm-1 per internal hydrogen bond. The O-O transitions of hydrate isomers with hydration shifts of only + 11 cm-1 per water molecule are reported.

DESCRIPTORS: (U) \*SPECTRA, CHEMICALS, DEUTERIUM, EXCITATION, HYDRATES, HYDRATION, HYDROGEN BONDS, INTENSITY, ISOTOPES, LASER INDUCED FLUORESCENCE, LASERS, MOLECULES, MONOMERS, QUINONES, REPRINTS, TRANSITIONS, MOLECULAR VIBRATION, TUNNELING(ELECTRONICS).

IDENTIFIERS: (U) PE81102F, \*Benzoquinone(2-5-dihydroxy-p-), Fluorescence excitation spectrum.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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MASSACHUSETTS INST OF TECH CAMBRIDGE

DESCRIPTORS: (U) \*ELECTRON PARAMAGNETIC RESONANCE, \*DEOXYRIBONUCLEIC ACIDS, CARBAMATES, CORRELATION, ELECTRONS, LIGANDS, LINKAGES, LUMINESCENCE, METAL COMPLEXES, PARAMAGNETIC RESONANCE, PROBES, REPRINTS, RUTHENIUM, SPECTRA, SURFACES, NITROGEN OXIDES, COVALENT BONDS, CHEMICAL RADICALS, CHEMICAL BONDS.

IDENTIFIERS: (U) Polypyridyl complexes, Electron paramagnetic resonance, B-DNA, PE81102F, \*Polypyridyl(Ruthenium(II)-), Binding site, Photophysical properties.

(U) Pressure-Induced Rotational Energy Transfer in H<sub>2</sub>CO A-circumflex 1A2 V<sub>4</sub> = 1: Dipolar M-Dependence with No Single-Collision Elastic Contribution.

92 38P

PERSONAL AUTHORS: Coy, Stephen L.; Halle, Scott D.; Kinsey, James L.; Field, Robert W.

CONTRACT NO. AFOSR-88-0082

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC  
TR-92-0871, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Molecular Spectroscopy, v153 p340-375 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We have performed a series of measurements on H<sub>2</sub>CO A(1) A sub 2 V<sub>4</sub> = 1 single rotational levels using Transient Gain Spectroscopy (TGS), which was designed to provide detailed information on state-to-state population transfer and on the relaxation and transfer of rotational alignment. Measurements of the time dependence of the population of the directly populated J sub Ka, Kc = 1 sub 0, 1 = 1 sub 0.1 level, and of the population that is collisionally transferred to the neighboring 0 sub 00 2 sub 0.2, and 3 sub 0.3 rotational levels, are performed with both parallel and perpendicular relative PUMP/PROBE polarizations. This procedure allows the rotational-state-resolved populations to be analyzed with a microscopic M-resolved kinetic model at a level of detail unprecedented for a polyatomic molecule. Our analysis is able to distinguish direct, single-collision dealignment from sequential processes that result in dealignment. Nonlinear fitting of these data with a number of kinetic models indicates that there is no detectable contribution from single-collision direct-elastic events to the observed dealignment signals, and that dealignment may be

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accurately modeled by sequential processes following electric-dipole a-dipole selection rules. Furthermore, state-to-state inelastic rates are found to partition into  $M$  sub  $j$  -resolved collisional transfer rates according to tensor opacity rank  $A = 1$  (electric-dipole amplitudes), with no detectable contribution from  $A = 2$  or  $A = 3$ .

DESCRIPTORS: (U) \*ENERGY TRANSFER, \*MOLECULAR SPECTROSCOPY, \*ANGULAR MOMENTUM, ALIGNMENT, AMPLITUDE, COLLISIONS, DIPOLES, KINETICS, OPACITY, POPULATION, PRESSURE, PROBES, PUMPS, RATES, RELAXATION, REPRINTS, SIGNALS, TENSORS, TRANSIENTS, POLYATOMIC MOLECULES.

IDENTIFIERS: (U) PE01102F, \*Methyl oxide, TGS(Transient Gain Spectroscopy).

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) The Cognitive, Perceptual, and Neural Bases of Skilled Performance.

DESCRIPTIVE NOTE: Annual technical rept. 15 Mar 91-14 Mar 92.

SEP 92 68P

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. AFOSR-90-0175

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC  
TR-92-0976, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report reviews progress from the Boston University, Northeastern University, and Harvard University/Cambridge University research groups of our AFOSR University Research Initiative grant. The reports lists books and articles, summaries of research, and selected abstracts of key articles. The reports also enclosed the program of an AFOSR-supported neural networks course and conference that were held at the Wang Institute of Boston University on May 5-12, 1991. The topic of the course was Neural Networks: From Foundations to Applications. Thirty-one lectures were given by ten lecturers. AFOSR helped to subsidize the student attendees. The topic of the conference was Neural Networks for Vision and Image Processing. There were sixteen invited speakers and forty-one contributed posters. Three hundred scientists and students attended from around the world. This conference was published as a book of the same name by the MIT Press in 1992. The Editorial Preface of the book is enclosed. The colloquium series speakers and topics of the Boston University URI component are also enclosed.

DESCRIPTORS: (U) \*PERCEPTION, \*COGNITION, \*NEURAL NETS, ABSTRACTS, BOOKS, GRANTS, IMAGE PROCESSING, IMAGES, LECTURES, NETWORKS, VISION, PERFORMANCE(HUMAN), REPORTS.

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AUTOMATIC, TARGET RECOGNITION, ADAPTIVE SYSTEMS, COMPUTER  
ARCHITECTURE, BEHAVIORAL SCIENCES.

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) High Resolution Vacuum Ultraviolet Stark Measurement  
of the Dipole Moment of A-circumflex 1A' HCN.

IDENTIFIERS: (U) PE61102F.

MAY 92 10P

PERSONAL AUTHORS: Jonas, David M.; Solina, Stephanl A.;  
Zhao, Xinsheng; Field, Robert W.

CONTRACT NO. AFOSR-88-0062

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC  
TR-92-0988, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v96 n10  
p7209-7217, 15 May 92. Available only to DTIC users. No  
copies furnished by NTIS.

ABSTRACT: (U) We report here the first measurement of  
the electric dipole moment of the 'A1A' state of HCN  
Fluorescence excitation spectra of the band were recorded  
using narrow band (< 0. 1/cm) vacuum ultraviolet (VUV)  
produced by four-wave sum mixing in an improved strontium  
heat pipe. Accurate (+ or - 0.007/cm) term values for  
this band are reported. Surprisingly, we found that the  
asymmetry doubling of the upper state does not  
extrapolate to zero at J = 0. We suggest that the most  
plausible explanation for this anomalous asymmetry  
doubling is a spin-orbit perturbation by a nearly  
degenerate level of the 13A1 state. The a component of  
the dipole moment has been determined by the Stark  
splitting of the Q(1) transition as a function of  
electric field in a novel Stark cell capable of  
sustaining high electric fields (41 kV/cm) at pressures  
of 50 mTorr. The observed value of the dipole moment u0 =  
0.99(10) D is in agreement with simple molecular orbital  
expectations and a semiempirical study.

DESCRIPTORS: (U) \*HYDROGEN CYANIDE, \*ELECTRONIC STATES,  
\*STARK EFFECT, ASYMMETRY, DIPOLE MOMENTS, ELECTRIC FIELDS,  
EXCITATION, FLUORESCENCE, HEAT PIPES, HIGH RESOLUTION,

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MOLECULAR ORBITALS, PERTURBATIONS, REPRINTS, SPECTRA,  
SPLITTING, STRONTIUM, TRANSITIONS, X BAND, VACUUM  
ULTRAVIOLET RADIATION.

SAN FRANCISCO STATE UNIV TIBURON CA ROMBERG TIBURON  
CENTERS

(U) Inhibition of DNA Binding by the Phosphorylation of  
Poly ADP-Ribose Polymerase Protein Catalysed by  
Protein Kinase C.

IDENTIFIERS: (U) PE81102F, Fluorescence excitation  
spectra.

92 8P

PERSONAL AUTHORS: Bauer, Pal I.; Farkas, Gyongyi; Buday,  
Laszlo; Mikala, Gabor; Meszaros, Gyorgy

CONTRACT NO. F49620-92-J-0232

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0943, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Biochemical and Biophysical  
Research Communications, v187 n2 p730-736, 16 Sep 92.  
Available only to DTIC users. No copies furnished by DTIC/  
NTIS.

ABSTRACT: (U) Purified type II (B) and type III (a)  
protein kinase C phosphorylates highly purified polyADP-  
ribose polymerase in vitro whereby 2 mols of phosphate  
are transferred from ATP to serine and threonine residues  
present in the 36 and 56 kDa polypeptide domains of the  
polymerase protein. Calf thymus DNA was a non-competitive  
inhibitor of the protein kinase C catalyzed  
phosphorylation of polyADP-ribose polymerase.  
Coincidental with the phosphorylation of the protein the  
polymerase activity and DNA binding capacity of polyADP-  
ribose polymerase were inhibited. These in vitro findings  
may have possible cell biological significance in  
cellular signal transduction.

DESCRIPTORS: (U) \*DEOXYRIBONUCLEIC ACIDS, \*ENZYME  
INHIBITORS, ADENOSINE PHOSPHATES, CELLS, PHOSPHATES,  
PHOSPHORUS, TRANSFERASES, PHOSPHORYLATION, PROTEINS,  
RESIDUES, RIBOSE, SERINE, SIGNALS, THYMUS, REPRINTS,  
CATALYSIS, IN VITRO ANALYSIS, PEPTIDES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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IDENTIFIERS: (U) PE61102F, WJAFOSR2312AS, \*PolyADP  
ribose polymerase, Chemical binding, Protein kinase C,  
Threonine, Cellular signal transduction.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

- (U) Adsorption of Anions on Ultra-Thin Metal Deposits on  
Single-Crystal Electrodes. 2. Voltammetric and  
Radiochemical Study of Bisulfate Adsorption on Pt(111)  
and Pt(poly) Electrodes Containing Copper Adatoms.

92 16P

PERSONAL AUTHORS: Varga, K.; Zelenay, P.; Wleckowski, A.

CONTRACT NO. AFOSR-89-0388

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0919, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Electroanalytical Chemistry,  
V330 p453-487 1992. Available only to DTIC users. No  
copies furnished by DTIC/NTIS.

ABSTRACT: (U) The formation of ultra-thin metal deposits  
of copper on Pt(111) and polycrystalline platinum  
electrodes, as well as the adsorption of bisulfate on the  
copper-covered platinum surfaces, were studied by cyclic  
voltammetry and radioactive labeling. The highest charge  
obtained by voltammetry in the underpotential stripping  
range nearly corresponds to a close-packed monolayer of  
copper. The radioactive labeling data indicate that there  
are inactive and active copper adlayers toward bisulfate  
adsorption. The transition from inactive to active  
behavior is interpreted in terms of an increase in  
surface-bisulfate interactions at the expense of surface-  
perchlorate interactions. Based on recent X-ray  
absorption near-edge spectroscopy (XANES) analysis of  
copper deposition onto platinum, the site for bisulfate  
adsorption is most probably a Cu<sup>+</sup> surface species.  
Combining this spectroscopic information with coulometry  
shows that an additional electron is confined to surface  
platinum atom(s) covered by the copper species. The  
copper film attains bulk copper properties when  
approximately 2.5 monolayers of copper are deposited.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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DESCRIPTORS: (U) \*ADSORPTION, \*DEPOSITION, \*ELECTRODES, \*SURFACE CHEMISTRY, ATOMS, COPPER, ELECTRONS, FILMS, INTERACTIONS, METALS, PLATINUM, POLYCRYSTALLINE, SPECTROSCOPY, VOLTAMMETRY, SULFATES, SINGLE CRYSTALS.

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Selective Direct Fluorination of Organolithium and Organomagnesium Compounds,

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1, Bisulfate adsorption, Platinum electrodes, XANES(X Ray Absorption Near Edge Structure).

92 4P

PERSONAL AUTHORS: DeYoung, James; Kawa, Hajima; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XF  
TR-92-0932, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Chemical Society, Chemical Communications, issue 11 p811-812 1982.  
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The first successful selective monofluorination of organolithium and organomagnesium compounds with elemental fluorine has been achieved in hydrocarbon ether solvents at low temperatures. Direct fluorination, Organolithium compounds, Organomagnesium compounds, Monofluorination.

DESCRIPTORS: (U) \*FLUORINATION, \*ORGANOMETALLIC COMPOUNDS, \*LITHIUM, \*MAGNESIUM, ETHERS, FLUORINE, HYDROCARBONS, SOLVENTS, TEMPERATURE, REPRINTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74L281

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COLORADO SEMINARY DENVER

MONTPELLIER-2 UNIV (FRANCE)

(U) Reactions and Spectroscopy of Excited Nitrenes.

(U) Sonogels in the Preparation of Advanced Glass and Ceramic Materials.

DESCRIPTIVE NOTE: Final rept. 1 Jul 90-31 Dec 91.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Aug 92.

OCT 92 29P

OCT 92 117P

PERSONAL AUTHORS: Coombe, Robert D.

PERSONAL AUTHORS: Zarzycki, J.

CONTRACT NO. AFOSR-90-0296

CONTRACT NO. AFOSR-89-0533

PROJECT NO. 1601

PROJECT NO. 2303

TASK NO. 08

TASK NO. A3

MONITOR: AFOSR, XF

TR-92-0949, AFOSR

MONITOR: AFOSR, XC

TR-92-0981, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress made on the research program 'Reactions and Spectroscopy of Excited Nitrenes' during the eighteen month period between 1 July, 1990 and 31 December, 1991. The broad objectives of the program include defining new means for the generation of halogen nitrene metastables, measuring the properties of processes by which these metastables transfer the energy they carry to laser candidate species, and probing the kinetics and mechanisms of second order reactions and energy transfer processes which may occur in the systems under high density conditions. Considerable progress toward these objectives was made during the period described by this report.

DESCRIPTORS: (U) \*NITROGEN COMPOUNDS, \*EXCITATION, \*SPECTROSCOPY, CHEMICAL REACTIONS, HALOGENS, METASTABLE STATE, ENERGY TRANSFER, LASERS, CHEMICAL LASERS, KINETICS, HIGH DENSITY, AMINES, IODINE, ATOMS, COLLISIONS, INFRARED SPECTRA, DECAY, ELECTRONS.

IDENTIFIERS: (U) PE83218C, WJAFOSR160108, \*Nitrenes, Radiative.

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ABSTRACT: (U) Ultrasonic irradiation of mixtures of alkoxides and water (the sonocatalytic method) was shown to provide an interesting way of preparing matrices for ceramic-ceramic composites. The gelation speed of the sonogels can be sufficiently controlled to avoid the segregation of short Al2O3 or ZrO2 fibres used as fillers. High homogeneity dispersions were produced in this way and the density of samples increased. In the case of cordierite, 5 SiO2, Al2O3, 2MgO matrices the strength of the composite strongly depends on the type of crystallographic phase, micro-cordierite which is converted into alpha-cordierite by a thermal treatment. Hot-pressing proved necessary, however, to obtain samples with sufficient mechanical strength. A substantial increase in the resistance was obtained by the addition of optimal quantity of TiO2 nucleant in precursor form to the starting cordierite sonosol. This method enables the hot-pressing to be performed while the matrix is in a glassy form, which improves the compaction by viscous flow. A subsequent thermal treatment is used to convert the seeded glass matrix into fine-grain glass-ceramic. The mechanical strength depended on the volume fraction of the filler phase (fibres). The best results obtained were: 105 MPa for cordierite-ZrO2 fibers and 158 MPa for cordierite-Al2O3 fibers composites.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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DESCRIPTORS: (U) \*GLASS, \*IRRADIATION, \*ULTRASONICS, \*GELS, DENSITY, DISPERSIONS, FIBERS, FILLERS, FINES, FLOW, GELATION, HOMOGENEITY, HOT PRESSING, MINERALS, MIXTURES, PHASE, PRECURSORS, QUANTITY, RESISTANCE, VELOCITY, VISCOUS FLOW, VOLUME, WATER, CERAMIC MATERIALS, OXIDES, ALUMINUM OXIDES, ZIRCONIUM, SILICON, MAGNESIUM, COMPOSITE MATERIALS, THERMAL PROPERTIES, TITANIUM, POROSITY, SOUND.

MICHIGAN UNIV ANN ARBOR

(U) Development and Application of a Model of Individual Decision Making in Military Contexts.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92.

JUL 92 4P

IDENTIFIERS: (U) PES1102F, \*Sonogels, Alkoxides, Sonocatalysis, Zirconium dioxide, Cordierite, Nucleants, Sonosol.

PERSONAL AUTHORS: Smith, Edward E.

CONTRACT NO. AFOSR-91-0285

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-0975, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research deals with the evaluation of category-based arguments, which have the form: 'Some members of category C have property P. Therefore other (all) members of category C have property P.' We have emphasized tasks in which the categories are familiar ones, like 'lions'. The properties are relatively familiar, like 'have skins that are resistant to penetration.' and the subject's task is to judge the probability that the conclusion is true given that the premises are. A sample item is: 'house cats have skins that are resistant to penetration. Therefore, lions have skins that are resistant to penetration.' In the last year, we have performed three experiments using tasks like this. Our major findings are that judged probability increases with (a) the similarity of the premise category to the conclusion category (the similarity of house cats to lions in the preceding example), and (b) the implausibility of the premise. We have developed a mathematical model of such probability judgments, which incorporates the factors of premise-conclusion similarity and premise plausibility, and which provides accurate quantitative predictions of the data. In related work, we have investigated category-based arguments that contain unfamiliar properties, such as 'has sesamoid bones.' In such case, similarity factors dominate.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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DESCRIPTORS: (U) \*MATHEMATICAL MODELS, \*PREDICTIONS, BONES, CATS, MODELS, PENETRATION, PROBABILITY, WORK.

IDENTIFIERS: (U) PE81102F, Philosophy, \*Logic, Arguments, Probabilities, Premises.

AD-A258 182 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL

(U) Methods and Convergence Analysis in Large Scale Nonlinear Optimization.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 Jul 92.

OCT 92 4P

PERSONAL AUTHORS: Toole, Jon W.

CONTRACT NO. AFDSR-88-0267

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFDSR, XC  
TR-92-0870, AFDSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new algorithm for the solution of large-scale nonlinear constrained optimization problems has been developed. The algorithm has been used to solve some optimal control problems with promising results.

DESCRIPTORS: (U) \*ALGORITHMS, \*OPTIMIZATION, \*NONLINEAR ANALYSIS, CONTROL, SCALE, PROBLEM SOLVING, CONVERGENCE.

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OHIO STATE UNIV COLUMBUS DEPT OF ENGINEERING MECHANICS

CALIFORNIA INST OF TECH PASADENA SOLAR ASTRONOMY GROUP

(U) On the Behavior of Non-Newtonian Fluids: Analysis, Computation and Experiment.

(U) Large-Scale Velocity Fields and Small-Scale Magnetic Fields During the Maximum of Solar Cycle 22.

DESCRIPTIVE NOTE: Final rept. 1 Apr-30 Sep 92.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 90-30 Sep 91.

SEP 92

3P

PERSONAL AUTHORS: Forest, M. G.

NOV 92

22P

CONTRACT NO. AFOSR-90-0253

PERSONAL AUTHORS: Martin, Sara F.; Harvey, K. L.

PROJECT NO. 2304

CONTRACT NO. AFOSR-90-0008

TASK NO. A4

PROJECT NO. 2311

MONITOR: AFOSR, XC  
TR-92-0854, AFOSR

TASK NO. AS

MONITOR: AFOSR, XC

TR-92-0868, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant progress has been achieved on key research projects that were supported by this grant. The researchers have extended the asymptotic modeling of free surface jets, through an averaging approach, to all orders in perturbation. These higher order theories were then extended to pointwise approximations, which yield more detailed characteristics of the flow. Dynamical imposedness of these model equations was discussed. Fully time-dependent model simulations were developed. Practical applications of these models were given for fiber spinning processes. Through interactions with government and private industry they have transferred this basic research to important applied problems.

DESCRIPTORS: (U) \*COMPUTATIONS, \*FLUIDS, \*NONNEWTONIAN FLUIDS, APPROACH, BEHAVIOR, EQUATIONS, FIBERS, FLOW, FORESTS, INDUSTRIES, INTERACTIONS, MODELS, PERTURBATIONS, SIMULATION, SURFACES, TIME, YIELD, APPROXIMATION(MATHEMATICS), SPINNING(INDUSTRIAL PROCESSES), FLUID MECHANICS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A4, Free surface jets.

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ABSTRACT: (U) The key accomplishments from the research during FY 1991 were: (1) the finding by K. Harvey and P. Foukal that the photospheric network is the third significant component that accounts for observed variations in the total solar irradiance; (The first previously recognized component is the temporary decreases due to sunspots and the second is variation due to plage brightness.) (2) the K. Harvey results from studying magnetic flux over the solar cycle: (a) increases in the total magnetic flux by a factor of 4 to 5 from solar minimum to solar maximum with the variation from active regions flux (>25 Gauss) by more than a factor of 20 from cycle minimum to maximum while the variation from quiet sun fields (<25 Gauss) was no more than a factor of 2. (b) Interpretation of (a) as meaning that more than 70% of the magnetic flux in active regions disappears without dispersing. (c) slower decreases of weak fields in phase with the decrease in strong fields, and (d) irregular pulses of new flux which appear to be primarily associated with active region complexes.

DESCRIPTORS: (U) \*MAGNETIC FIELDS, \*SOLAR CYCLE, BRIGHTNESS, FILAMENTS, INVERSION, NETWORKS, POLARITY, PULSES, SCALE, SUN, SUNSPOTS, VELOCITY.

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IDENTIFIERS: (U) Solar cycle, Small-scale magnetic fields, Large-scale velocity fields, Polarity inversion zones, Filaments, WUAFOSR2311AS, PE61102F, \*Velocity fields.

RICE UNIV HOUSTON TX

(U) Comparing Performance on Implicit Memory Tests.

DESCRIPTIVE NOTE: Final technical rept. Aug 91-Aug 92.

SEP 92 37P

PERSONAL AUTHORS: Roediger III, Henry L.

CONTRACT NO. AFOSR-91-0253

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XC  
TR-92-0828, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) AFOSR Grant 91-0253 supported four different lines of research, described herein. These are (1) a preliminary experiment to clarify our testing procedures; (2) experiments designed to examine effects of various types of repetition on several memory tests; (3) experiments designed to examine the effect of distinctive events on these tests; and (4) experiments designed to examine inhibition and spontaneous recovery in memory. The progress made on each topic is described in the four sections of this Final Technical Report. Briefly, all four lines of work have been carried to a successful completion, although in two cases (II and IV) data are still being analyzed. Several publications from this research are either being published, written or planned at this writing.

DESCRIPTORS: (U) \*MEMORY(PSYCHOLOGY). \*EXPERIMENTAL PSYCHOLOGY. \*LEARNING. \*COGNITION, INHIBITION, RECOVERY, TEST AND EVALUATION, CONSCIOUSNESS, VERBAL BEHAVIOR, PERFORMANCE(HUMAN).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7, Implicit memory tests, Neuropsychology.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A258 187 12/8

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

RESPONSE, SEQUENCES, SPEECH, THEORY, TIME, SELF ORGANIZING SYSTEMS.

(U) Computer and Mathematical Modelling of Massively Parallel Architectures for Self-Organizing Neural Pattern Recognition Machines.

IDENTIFIERS: (U) WJAFOSR2304A1, PE8102F.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 90-30 Jun 92.

OCT 92 11P

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. AFOSR-90-0128

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0958, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Substantial progress has been made in several research areas. For example, a new class of neural networks has been developed which are defined by high-dimensional nonlinear dynamics systems that operate at multiple time scales. They are designed to carry out fast, stable autonomous learning of recognition codes and multidimensional maps in response to arbitrary sequences of input patterns. The new neural networks architecture, called ARTMAP, autonomously learns to classify many arbitrarily ordered vectors into recognition categories based on predictive success. In other research, these investigators developed a new model of temporal prediction that is based upon analysis of how animals and humans learn to time their actions to achieve desired goals. Research was also conducted on the neural dynamics of speech filtering and segmentations, measurement theory, and temporal predictions reinforcement learning, and autonomous credit assignment.

DESCRIPTORS: (U) \*COMPUTER ARCHITECTURE, \*MATHEMATICAL MODELS, \*COMPUTERIZED SIMULATION, ALLOCATIONS, ANIMALS, ARCHITECTURE, COMPUTERS, DYNAMICS, FILTRATION, HUMANS, INPUT, LEARNING, MACHINES, MAPS, MODELS, NETWORKS, PATTERN RECOGNITION, PATTERNS, PREDICTIONS, RECOGNITION,

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PENNSYLVANIA UNIV PHILADELPHIA SCHOOL OF ENGINEERING AND APPLIED SCIENCE

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Computational and Neural Network Models for the Analysis of Visual Texture.

(U) Lateral Modification and the Organization of CO-I Mixed Adlattices on Pt(111).

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 Jul 92.

92 8P

OCT 92 16P

PERSONAL AUTHORS: Bajcsy, R.; Gerstein, G.

PERSONAL AUTHORS: Zurawski, D.; Wleckowski, A.

CONTRACT NO. AFOSR-88-0296

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2313

PROJECT NO. 2303

TASK NO. AB

TASK NO. A1

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-92-0951, AFOSR

TR-92-0935, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The grant supported research efforts in two main research questions: (1) How do we segment and estimate the slant/tilt of natural scenes with highly irregular textures, using both biological and non-biological computing architectures; and (2) How do we design machine perception and action systems and learning mechanisms that can improve their performance through repeated feedback and interaction with their environment? Section 2 describes the research and publications relating to the slant/tilt and segmentation problem. Section 3 describes research and publications using developmental psychological and machine learning frameworks for learning visuomotor tasks. Finally, Section 4 summarizes the two Ph.D dissertations in the Department of Computer and Information Science made possible with AFOSR support.

DESCRIPTORS: (U) \*TEXTURE, \*COMPUTATIONS, \*IMAGE PROCESSING, \*NEURAL NETS, ARCHITECTURE, COMPUTERS, DOCUMENTS, ESTIMATES, FEEDBACK, GRANTS, INFORMATION SCIENCES, INTERACTIONS, LEARNING, MACHINES, MODELS, NETWORKS, PERCEPTION, THESES, TILT, ROBOTICS.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2313AB.

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Availability: Pub. in Langmuir, v8 n9 p2317-2323 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Modification of the electroactivity and organization of the CO adlattice on Pt(111) by coadsorbed iodine was investigated utilizing a combination of in situ voltammetric measurements and ex situ analysis by low energy electron diffraction (LEED). Three solution dosing procedures were used to form the mixed adlattices, all resulting in immiscible domains of CO and iodine. Iodine was found to retard the CO electrooxidation reaction by compressing the CO domains, making them more difficult to nucleate with oxidant. The overpotential for oxidation has been correlated with the extent of compression determined by LEED measurements. In turn, the compression and resulting CO adlattice structure were found to depend on the route by which the mixed adlattice was formed. The presented LEED surface crystallography and electrochemistry analysis offer an insight into long range organization of the mixed CO-I adlattices. Comparison with short-range organization awaits complementary scanning tunneling and atomic force microscopy results.

DESCRIPTORS: (U) \*IODINE, \*PLATINUM, \*CARBON MONOXIDE, COMPRESSION, CRYSTALLOGRAPHY, DIFFRACTION, ELECTROCHEMISTRY, ELECTRON DIFFRACTION, ELECTRONS, ENERGY, LOW ENERGY, MEASUREMENT, MICROSCOPY, MODIFICATION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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ORGANIZATIONS, OXIDATION, OXIDIZERS, SCANNING, STRUCTURES, SURFACES, TUNNELING, REPRINTS, LATTICE DYNAMICS, ADSORPTION, VOLTAMMETRY, NUCLEATION.

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT  
(U) Interconversion of Diborane (4) Isomers,

IDENTIFIERS: (U) PES1102F, WUAFOSR2303A1, Adlattices, In situ, Overpotential, Atomic force microscopy, Coadsorption systems, Electrooxidation.

JUL 92 7P

PERSONAL AUTHORS: Stanton, John F.; Gauss, Juergen; Bartlett, Rodney J.

CONTRACT NO. AFOSR-89-0207

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XC  
TR-82-0920, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97 n2 p1211-1218, 15 Jul 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Highly correlated electronic structure calculations using many-body perturbation theory and coupled-cluster gradient techniques are applied to a study of a reaction pathway which links the two forms of diborane. A reaction coordinate which preserves (C sub 2) symmetry is studied, as this mechanism is allowed by orbital symmetry rules. However, calculations show that the minimum energy path does not conform to this idealized mechanism. Rather, the reaction coordinate bifurcates, and the transition state contains no nontrivial elements of symmetry. At the level of partial fourth-order many-body perturbation theory with a large triple-zeta plus double polarization basis set, differences in distances between the hydrogen atoms corresponding to the bridge atoms in the (C sub 2v) form and the two boron atoms are 0.14 and 0.81 A, reflecting the pronounced asymmetry of the transition state structure.

DESCRIPTORS: (U) \*DIBORANES, \*ISOMERS, REPRINTS, BORANES, CONVERSION, QUANTUM THEORY, PERTURBATION THEORY, HYDROGEN, COUPLINGS, SYMMETRY, ENERGY, BIFURCATION(MATHEMATICS), TRANSITIONS, BORON, ATOMS, POLARIZATION, THERMODYNAMICS, MOLECULES, BARRIERS, ISOMERIZATION.

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TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE81102F, WJAF0SR230383,  
Interconversion, MBPT(Many Body Perturbation Theory),  
Minimum energy path, Basis set, Triple zeta.

(U) A New Synthetic Procedure for the Preparation and  
Manufacture of Perfluoropolyethers.

92 31P

PERSONAL AUTHORS: Lagow, Richard J.; Bierschenk, Thomas R.  
; Juhlke, Timothy J.; Kawa, Hajimu

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC  
TR-92-0934, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Synthetic Fluorine Chemistry, p97-  
126 1992. Available only to DTIC users. No copies  
furnished by NTIS.

ABSTRACT: (U) Perfluoropolyethers are an extraordinary  
class of high-performance fluids which are useful as high  
temperature lubricants and for many other applications.  
Lower molecular weight perfluoropolyethers are used for  
applications such as vapor phase soldering fluids,  
thermal shock fluids and inert fluids. While the first  
perfluoropolyethers appeared in the early 1970s, the  
technology that will dominate this field and the  
associated industry is emerging from our research  
laboratories at The University of Texas at Austin and at  
Exfluor Research Corporation. Our research group has  
already synthesized more new structures of  
perfluoropolyether lubricant fluids than all other  
sources combined. In our laboratories, controlled  
reactions of hydrocarbon starting materials and elemental  
fluorine have been pursued first on a small scale in the  
academic laboratory and scaled up very effectively at  
Exfluor Research Corporation. Currently, the highest  
molecular weight perfluoropolyether obtainable by others  
using conventional polymerization processes is 50,000--  
with a viscous syruplike consistency. Perfluoropolyethers,  
Direct fluorination, Lubricants.

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DESCRIPTORS: (U) \*LUBRICANTS, \*FLUOROPOLYMERS, \*POLYETHERS, CONSISTENCY, FLUIDS, FLUORINATION, FLUORINE, HIGH TEMPERATURE, HYDROCARBONS, INDUSTRIES, LABORATORIES, MATERIALS, MOLECULAR WEIGHT, PHASE, POLYMERIZATION, SCALE, SHOCK, SOLDERING, STRUCTURES, TEMPERATURE, TEXAS, THERMAL SHOCK, VAPOR PHASES, VAPORS, WEIGHT, REPRINTS, SYNTHESIS, ORGANIC COMPOUNDS, INERT MATERIALS.

PRATT AND WHITNEY WEST PALM BEACH FL GOVERNMENT ENGINES AND SPACE PROPULSION

(U) Fiber Coating by Sputtering for High Temperature Composites.

DESCRIPTIVE NOTE: Final technical rept. 15 May 89-14 Aug 92.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, Perfluoropolyethers, Insert fluids, Crown ethers.

OCT 92 79P

PERSONAL AUTHORS: Emiliani, M. L.

REPORT NO. PW-FR-21538

PROJECT NO. 8838

TASK NO. 00

MONITOR: AFOSR, XC  
TR-92-0860, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this activity was to support researchers at the University of California at Santa Barbara in their development of micromechanics models and new or improved high temperature composite systems. This was achieved through the application of sputtered and sol-gel coatings onto monolithic metal and ceramic foils and plates, respectively, as well as high strength monofilament ceramic fibers. The base program aided in the identification and deposition numerous different types of coatings for the several composite systems under evaluation at UCSB. At the conclusion of the base program, promising composite systems were identified for further study and processing via continuous sputtering and sol-gel processing. In addition to providing coated materials to UCSB, P and W also engaged in focused studies of coatings found to be promising by UCSB researchers. The base program study examined as-sputtered Y2O3 coatings deposited onto various substrates to understand why this coating improves the toughness of Nb-reinforced TiAl. The option program study characterized tungsten and molybdenum coatings applied by hollow cathode magnetron sputtering, and aluminum oxide coatings applied by sol-gel processing. Sputtering. Coating. Debond. Composites fracture energy.

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SEARCH CONTROL NO. 74L281

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Fracture toughness, Indentation.

DESCRIPTORS: (U) \*COATINGS, \*HIGH TEMPERATURE, \*SPUTTERING, \*COMPOSITE MATERIALS, ALUMINUM OXIDES, CALIFORNIA, CATHODES, CERAMIC FIBERS, DEPOSITION, ENERGY, FIBERS, GELS, HIGH STRENGTH, IDENTIFICATION, MAGNETRONS, MATERIALS, METALS, MOLYBDENUM, OXIDES, PLATES, PROCESSING, SUBSTRATES, TEMPERATURE, TOUGHNESS, TUNGSTEN, MECHANICS, FOILS(MATERIALS), FILAMENTS, NIOBIUM, TITANIUM, YTTRIUM OXIDES.

IDENTIFIERS: (U) PE81102S, WJAFOSR883800, Sol gel processing.

AD-A258 045 20/7 20/8

CORNELL UNIV ITHACA NY DEPT OF ELECTRICAL ENGINEERING

(U) Novel Methods of Acceleration.

DESCRIPTIVE NOTE: Final rept. 30 Sep 88-29 Jan 92.

JAN 92 28P

PERSONAL AUTHORS: Nation, John A.

CONTRACT NO. AFOSR-88-0328

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR, XC  
TR-92-0928, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work summarized in this report covers two research topics. The first deals with a feasibility study of the use of induction linac technology for the production of a multistage proton accelerator, while the second deals with the generation and application of intense microwave radiation signal for use in a compact high average current electron accelerator. The induction linac study was motivated by the objective of obtaining a high current (several kA) deuteron beam of about 30 MeV for neutron production and also to model the late stages of an induction linac system for use in a heavy ion fusion reactor, and the latter study by the possibility of using ultra high power microwave sources developed in our laboratory and elsewhere for the construction of an electron accelerator for use in applications such as FEL drivers. In this report we summarized both programs. Details of the results obtained may be found in the published papers, copies of which are appended to this report.

DESCRIPTORS: (U) \*DEUTERON BEAMS, \*ELECTRON ACCELERATORS, \*HEAVY IONS, \*NEUTRONS, \*PROTON ACCELERATORS, CONSTRUCTION, DEUTERONS, ELECTRONS, FEASIBILITY STUDIES, HIGH POWER, IONS, LABORATORIES, MICROWAVES, MODELS, POWER, PRODUCTION, PROTONS, RADIATION, SIGNALS, WORK.

IDENTIFIERS: (U) WJAFOSR2301A8.

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TENNESSEE UNIV KNOXVILLE

AD-A258 033 6/1 7/4 7/3 8/13  
IOWA UNIV IOWA CITY

(U) Microwave Interaction with Plasmas.

(U) A Biotechnical Approach to Studies on the Biodegradation of Chlorobenzenes and Trichloroethylene.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 92.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 May 92.

APR 92 10P

OCT 92 9P

PERSONAL AUTHORS: Alexeff, Igor

PERSONAL AUTHORS: Gibson, David T.

CONTRACT NO. AFOSR-39-0348

REPORT NO. DOT/FAA/PP-92-5

PROJECT NO. 2301

CONTRACT NO. AFOSR-88-0225

TASK NO. A8

PROJECT NO. 2303

MONITOR: AFOSR, XC

TASK NO. 82

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC  
TR-92-0927, AFOSR

ABSTRACT: (U) During the past year, we have made progress on frequency shifting by means of plasmas. Theoretically we have demonstrated that a rising plasma density tends to slow down and trap microwaves passing through the plasma-filled region. This increases the interaction time, so that a very rapid rise in plasma density is not required to produce very high frequency shifts. A preliminary version has been submitted to the Transactions of Plasma Science, and more updated version is in progress. An attempt to provide frequency upshifts by use of multiple transverse arcs was attempted without the use of equalizing resistors. The plasma discharge was observed, and the frequency upshift was seen, as was expected but it was not as extensive as in previous systems. A more balance system is being developed.

DESCRIPTORS: (U) \*FREQUENCY SHIFT, \*INTERACTIONS, \*MICROWAVES, \*PLASMA JETS, \*ELECTRIC ARCS, \*COMPUTER PROGRAMS, BALANCE, DENSITY, FREQUENCY, HIGH FREQUENCY, REGIONS, RESISTORS, SHIFTING, TIME, TRANSVERSE, TRAPS, VERY HIGH FREQUENCY, PLASMA DEVICES, MAGNETOHYDRODYNAMICS.

IDENTIFIERS: (U) Magic program, Ball lightning, Bohm diffusion, WUAFOSR2301A8.

AD-A258 044

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UNCLASSIFIED REPORT

ABSTRACT: (U) The absolute stereochemistry of the chiral dihydrodiols formed from ortho- and meta-dichlorobenzene were determined. Both diols were found to be enantiomerically pure with 15.2S absolute configuration. Toluene-grown cells of Pseudomonas putida F1 and Pseudomonas sp. JS150 were found to oxidize 2- and 3-nitrotoluene to benzyl alcohols. These results represent the first demonstration of the oxidation of a methyl substituent by toluene dioxygenase. Both organisms oxidized 4-nitrotoluene to 2-methyl-5-nitrophenol and 3-methyl-6-nitrocatechol. The significance of these unexpected results was evaluated.

DESCRIPTORS: (U) \*CHLOROBENZENE, \*TRICHLOROETHYLENE, ALCOHOLS, CELLS, CONFIGURATIONS, DEMONSTRATIONS, NITROPHENOLS, NITROTOLUENES, OXIDATION, PSEUDOMONAS, STEREOCHEMISTRY, TOLUENES, HALOGENATED HYDROCARBONS, MICROBIOLOGY, BIOTECHNOLOGY, BIOCHEMISTRY, DEGRADATION, BIOLOGY, PROCESSING, BENZYL RADICALS, METHYL RADICALS, DIENES, SYNTHESIS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B2, Chiral dihydrodiols, Enantiomers, Putida, Dioxygenase, Nitrocatechol, Ortho, Meta.

AD-A258 033

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AD-A258 020 6/13 21/4 8/8

AD-A258 020 CONTINUED

NOTRE DAME UNIV IN DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Biodegradation of Jet Fuel-4 (JP-4) in Sequencing Batch Reactors.

than 50 ug/L and usually to below 20 ug/L and met the

DESCRIPTORS: (U) \*CONSORTIUMS, \*GASOLINE, \*JET ENGINE FUELS, \*REACTOR OPERATION, \*BACTERIA, ATMOSPHERES, CYCLES, EXPERIMENTAL DATA, FUELS, OXYGEN, RATES, SCALE, SOILS, UTILIZATION, WATER, CONTAMINATION, CARBON, PSEUDOMONAS, TOXICOLOGY, POLLUTION.

DESCRIPTIVE NOTE: Annual rept. (Final) 1 Sep 91-31 Aug 92.

JUN 92 22P

IDENTIFIERS: (U) SBR(Sequencing Batch Reactor), Bioremediation, Headspace, Pseudomonas luteola.

PERSONAL AUTHORS: Bumpus, John A.

REPORT NO. UNDA-AFOSP-1-91/92

CONTRACT NO. AFOSR-91-0404

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF  
TR-92-0964, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Several bacterial consortia were evaluated for use in the development of a sequencing batch reactor (SBR) for bioremediation of water contaminated with Jet Fuel-4. (JP-4). All of the bacterial systems tested had some ability to degrade components of JP-4. However, because of its ability to degrade rapidly components of JP-4 and because of its rapid oxygen utilization rates, a bacterial consortium from a soil contaminated with gasoline was selected for further study and was used in the development of an SBR to treat contaminated water. The bench scale SBR developed had a three liter capacity and a 1.5 liter head space. The atmosphere in the head space was changed only during the fill and draw portion of the reactor cycle. At other times, the system was closed and the only oxygen available was that dissolved in the water being treated or in the atmosphere of the headspace. Calculations revealed and experimental data confirmed that this amount of oxygen was sufficient to support extensive bioremediation of water contaminated with JP-4. Results demonstrated that this SBR was consistently able to bioremediate water contaminated with JP-4. During 12 hr cycle times the amount of JP-4 present (30 - 39 mg/L) was always reduced to less than 50 ug/L and usually to below 20 ug/L was always reduced to less

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A258 005 CONTINUED

AD-A258 005 21/2 20/4

UNITED TECHNOLOGIES CORP SAN JOSE CA CHEMICAL SYSTEMS  
DIV

PROPELLANTS, SOLIDS, STATIONS, STRUCTURES, SURFACES,  
VARIATIONS, VELOCITY, VOLUME, WALLS.

(U) Oscillatory Internal Flow Fields Studies.

DESCRIPTIVE NOTE: Final rept..

AUG 82 90P

PERSONAL AUTHORS: Shaeffer, C. W.; Brown, R. S.

MONITOR: AFOSR, XC  
TR-82-0958, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All  
DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Experimental studies have been conducted to measure the structure of oscillatory waves in the presence of the rotational flow field which characterizes the internal ballistics of solid propellant rockets. Cold flow results demonstrated that extensive rotational behavior of oscillatory flows are associated with the types of flows. These rotational effects extend over significant portions of the chamber volume, both radially and axially. Radial variations in the amplitude of the axial oscillatory velocity appear to be related to radial momentum effects. The distance between the peaks correlates with approximate solutions of the radial momentum equation. Further downstream, convection effects from the mean flow distorts these radial variations at low surface Mach numbers. Significant nonlinear behavior was observed near the wall at three axial stations. At lower surface mach numbers, this behavior extended all the way across the chamber at the downstream location (5.48 diameters). This nonlinear behavior occurred at a much lower oscillatory pressure than previously expected. From the observed effect of surface Mach number, it appears the nonlinearities are associated with interactions between the mean and oscillatory flows.

DESCRIPTORS: (U) \*AMPLITUDE, \*COMBUSTION, \*FLOW FIELDS, \*OSCILLATION, BALLISTICS, BEHAVIOR, CHAMBERS, COLD FLOW, CONVECTION, DIAMETERS, EQUATIONS, INSTABILITY, INTERACTIONS, INTERNAL, MACH NUMBER, MEAN, MOMENTUM, NUMBERS, PRESSURE, PROPELLANTS, ROCKETS, SOLID

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SEARCH CONTROL NO. T4L281

AD-A258 003 12/1

AD-A258 001 20/14 9/1 20/10 20/8

LAFAYETTE COLL EASTON PA

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Combinatorial Reliability and Repair.

(U) Wafer Scale Union.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 Jul 92.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 May 92.

JUL 92 3P

MAY 92 136P

PERSONAL AUTHORS: Traldi, Lorenzo

PERSONAL AUTHORS: Fetterman, Harold

CONTRACT NO. AFOSR-91-0274

CONTRACT NO. F49620-89-C-0058

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. ES

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0913, AFOSR

MONITOR: AFOSR, XC  
TR-92-0924, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) During the Summers of 1991 and 1992 the principal investigator research the use of combinatorial techniques in analyzing problems involving the repair of K-terminal networks, which are networks given with a distinguished subset K of the vertex-set. (Ordinary graph theory can be viewed as being equivalent to the special case  $K=V(G)$ .) There are large bodies of existing literature describing the uses of such techniques in analyzing (1) ordinary networks (for which the reliability and repair problems are very similar to each other, being connected with certain matroids associated to the network) and (2) K-terminal reliability problems: the fundamental problem is to find out how these two bodies of material generalize to the repair of K-terminal networks. The original proposal listed several specific areas of research, of which the second and fifth turned out to be the most interesting.

DESCRIPTORS: (U) \*COMBINATORIAL ANALYSIS, BODIES, GRAPHS, MATERIALS, NETWORKS, RELIABILITY, REPAIR, SUMMER, TERMINALS, THEORY, TRANSFORMATIONS (MATHEMATICS), DELTAS.

IDENTIFIERS: (U) PES1102F, WJAFOSR2304ES.

ABSTRACT: (U) The program we have completed will be discussed in three basic sections. The first will deal with the important developments in optically controlled generation of millimeter waves. This work started from earlier results of mixing high frequencies internally using FETs and HEMTs. In this study, these initial experiments were successfully extended to radiating systems in free space to using new HBTs and semiconductor lasers. Section (B) will deal with our advanced picosecond measurements and HEMTs, HBTs and Hot Electron Transistors. It will also present our measurement of bandwidths of channel guides on wafer using our mixing and picosecond techniques. Finally, in section (C), we discuss the new Quantum Well Impatt, polymer modulators, optical guide developments and InSb devices. Many of these new concepts are just becoming experiment. The overall view of integration is discussed in this third section.

DESCRIPTORS: (U) \*HIGH FREQUENCY, \*MILLIMETER WAVES, \*WAFERS, \*OPTICS, BANDWIDTH, CHANNELS, ELECTRONICS, FREQUENCY, INTEGRATION, LASERS, MEASUREMENT, MIXING, MODULATORS, SEMICONDUCTOR LASERS, SEMICONDUCTORS, TRANSISTORS, WORK, FIELD EFFECT TRANSISTORS, QUANTUM ELECTRONICS, POLYMERS, INDIUM, ANTIMONY, OPTICAL EQUIPMENT, IMPATT DIODES, ELECTRON MOBILITY, SCALE.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A258 001 CONTINUED

AD-A257 969 4/2 17/9

IDENTIFIERS: (U) WJAFOSR2301AS, PE81102F, Radiating systems, Free space, HEMT(High Electron Mobility Transistors), Quantum well impatt, Union.

CLENSON UNIV SC DEPT OF PHYSICS

(U) Radar Interferometer Investigations of the Horizontal Winds, Vertical Velocities, Vorticity, and Divergence Around Frontal Zones and in Mesoscale Waves.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 91-14 Sep 92,

SEP 92 185P

PERSONAL AUTHORS: Larsen, Miguel F.

CONTRACT NO. AFOSR-91-0384

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XC  
TR-92-0945, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the research has been to use the state-of-the-art, phased-array MU radar facility in Kyoto, Japan, to study the perturbation winds and turbulence associated with frontal zones and mesoscale waves. There are four critical parameters in the dynamical studies. They include unbiased estimates of the horizontal winds, unbiased estimates of the vertical velocities, the location and strength of turbulent layers within the scattering volume, and the vorticity and divergence within the flow. Standard beam-swinging Doppler measurements lead to large biases in the vertical velocities and possible biases in the horizontal winds, the location of the scattering layers can only be determined with the uncertainty of the pulse volume, and vorticity measurements are not possible. Research during the first year has focused on the development of techniques for eliminating large biases in vertical velocity measurements that result when standard vertical beam Doppler methods are used, for eliminating biases in horizontal wind measurements that result with Doppler beam swinging techniques due to horizontal gradients in the flow. We have also worked on developing new techniques for measuring the vorticity and divergence in the flow. The MU radar operates at a frequency close to 50 MHz and has a transmitting/receiving antenna array 103

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m in diameter. The beam can be steered from pulse to pulse, and the receiving array can easily be divided into sub-arrays for reception. All the system parameters are under software control so that changes can easily be implemented, and different experimental configurations can be tested quickly.

DESCRIPTORS: (U) \*PHASED ARRAYS, \*TURBULENCE, \*RADAR METEOROLOGY, \*FRONTS(METEOROLOGY), ANTENNAS, ANTENNA ARRAYS, CONFIGURATIONS, FLOW, GRADIENTS, INTERFEROMETERS, LAYERS, MEASUREMENT, PARAMETERS, PERTURBATIONS, PULSES, RADAR, RECEPTION, STANDARDS, STATE OF THE ART, TRANSMITTING, VELOCITY, VOLUME, WIND, ELECTROMAGNETIC SCATTERING, VORTICES.

IDENTIFIERS: (U) Mesoscale waves.

AD-A257 937 23/3 9/5 20/6 24/1

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Development of Neural Modules Based on SI/PLZT Technology for Opto-Electronic Implementations of Neural Networks.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 May 92.

MAY 92 38P

PERSONAL AUTHORS: Esener, Sadik C.; Lee, Sing H.

CONTRACT NO. AFOSR-90-0018

MONITOR: AFOSR, XC  
TR-92-0923, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the research program was to design opto-electronic neuron modules communicating via free-space optical interconnects, and to develop SI/PLZT opto-electronic integrated circuit technology in order to implement these designs. First, device and system requirements for artificial neural networks were studied. Minimum performance requirements for artificial neural networks implementations were extracted. Next, two opto-electronic neural network architectures were developed. The first achieves reconfigurable optical interconnects using photorefractive crystals. This system was theoretically and experimentally investigated. The second reconfigurable weights based on SI/PLZT technology. A prototype of this system was successfully built and tested. The performance of both systems exceed the minimum requirements. The first year effort involved the design of the optoelectronic architectures, the further development of the SI/PLZT process, the development of optimal neural networks data-encoding methods, and analysis of the system performances. The remaining period entailed the experimental demonstration of the CMTM system, an the development, characterization, and application of the D-STOP prototype system.

DESCRIPTORS: (U) \*INTEGRATED CIRCUITS, \*NEURAL NETS, \*SILICON, \*HOLOGRAPHY, \*ELECTROOPTICS, ARCHITECTURE, CIRCUITS, CRYSTALS, DEMONSTRATIONS, ELECTRONICS, NERVE CELLS, NETWORKS, PROTOTYPES, REQUIREMENTS, WEIGHT.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A257 937 CONTINUED

MODULAR CONSTRUCTION.

IDENTIFIERS: (U) \*Optical interconnections, Synaptic valves.

AD-A257 938 7/4 20/2 7/2

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Some Applications of Lattice-Gas Models to Electrochemical Adsorption.

92

7P

PERSONAL AUTHORS: Rikvoid, P. A.; Wleckowski, A.

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0838, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physica Scripta, VT44 p71-78 1992.  
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We discuss some applications of simple lattice-gas models to electrochemical adsorption. Different values of the model interactions can cause either poisoning behavior or enhanced adsorption to be observed. It is described how these behaviors are closely related to the topologies of the adsorbate phase diagrams. Applications to the poisoning by S of H on Pt(111), and, as an example of enhanced adsorption, the electroadsorption of naphthalene on Cu, are considered. Finally, recent voltammetric data are presented for the adsorption of urea on monocrystalline Pt(100). We propose that the observed behavior is the result of a first-order phase transition in a submonolayer of adsorbed urea and hydrogen, and we present a lattice-gas model based on this idea.

DESCRIPTORS: (U) \*ADSORPTION, \*MODELS, \*POISONING, \*ELECTROCHEMISTRY, \*GASES, ADSORBATES, BEHAVIOR, DIAGRAMS, HYDROGEN, INTERACTIONS, NAPHTHALENES, PHASE, PHASE DIAGRAMS, PHASE TRANSFORMATIONS, TRANSITIONS, UREA, VALUE, REPRINTS, TOPOLOGY, PLATINUM, COPPER, VOLTAMMETRY, ELECTRODES, ELECTROLYTES, SINGLE CRYSTALS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A1, Lattices, Electroadsorption, Monocrystalline, Monolayers.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A257 935 CONTINUED

JET PROPULSION LAB PASADENA CA

COMPUTER ARCHITECTURE, MATHEMATICAL MODELS, PATTERN  
RECOGNITION.

(U) An Information Theoretic Approach to Distributed  
Inference and Learning.

IDENTIFIERS: (U) PES1101E.

DESCRIPTIVE NOTE: Final rept. 1 Feb 90-31 May 92.

OCT 92 35P

PERSONAL AUTHORS: Smyth, Padhraic

CONTRACT NO. N00014-92-J-1880, AFOSR-90-0199

PROJECT NO. 7013

MONITOR: AFOSR, XC  
TR-92-0912, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes research work which was funded under grant number AFOSR90-00199 during the period February 1st 1990 to May 31st 1992. Our work has focused on developing information-theoretic and probabilistic models for neural network computation. This theoretical basis is then used to develop novel hybrid network architectures, which combine techniques from the fields of statistics and artificial intelligence with neural approaches. The report describes a number of significant results including identification of the general class of energy functions which lead to proper probability estimation, a new algorithm which builds hybrid rule-based network models from data, Markov random field theory and algorithms for constructing network models from large databases, new results on sparse Markov models, a new hybrid unsupervised/supervised learning algorithm with applications to computer vision problems, a novel recurrent network structure, and prototype VLSI hardware implementations of these ideas. A Total of 30 technical papers have resulted from this grant.

DESCRIPTORS: (U) \*NEURAL NETS, \*INFORMATION THEORY, ALGORITHMS, APPROACH, ARCHITECTURE, ARTIFICIAL INTELLIGENCE, COMPUTATIONS, COMPUTER VISION, COMPUTERS, DATA BASES, ENERGY, FIELD THEORY, FUNCTIONS, GRANTS, IDENTIFICATION, INTELLIGENCE, LEARNING, MODELS, NETWORKS, NUMBERS, PROBABILITY, PROTOTYPES, STATISTICS, STRUCTURES, THEORY, VERY LARGE SCALE INTEGRATION, VISION, WORK.

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AD-A257 934

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AD-A257 934 CONTINUED

CALIFORNIA UNIV BERKELEY SCHOOL OF OPTOMETRY

(U) Spatio-Temporal Masking: Hyperacuity and Local Adaptation.

DESCRIPTIVE NOTE: Final rept. 1 Jan 89-31 Jul 92.

OCT 92 9P

PERSONAL AUTHORS: Klein, Stanley A.

CONTRACT NO. AFOSR-89-0238

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XC  
TR-92-0950, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A. Models of human vision were applied to image compression and image fidelity for both static and dynamic images. The role of the human observer in JPEG compression was clarified. The human observer's visual information capacity was calculated to be about 20 bits/min<sup>2</sup>, substantially higher than previous estimates. New formulas were developed for the Fourier transform of JPEG basis functions, connecting JPEG quantization matrices to the human observer's contrast sensitivity function. Crawford masking was used to measure the visibility of lines and edges following abrupt luminance changes. The high frame rates produced higher temporal resolution than previous studies. A striking asymmetry between light and dark lines was found. (b) A robust test-pedestal framework was developed for modeling spatio-temporal vision with fewer assumptions than previous models. In this framework motion processing and hyperacuity thresholds are directly related to contrast processing. (c) A number of studies on motion processing developed new limits on the human visual system's capabilities. (d) In order to connect psychophysics results to underlying physiological mechanisms new techniques were developed for nonlinear analysis and source localization of visual evoked potentials and other biopotentials

DESCRIPTORS: (U) \*VISION, ASYMMETRY, COMPRESSION.

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CONTRAST, DYNAMICS, EDGES, ESTIMATES, FRAMES, FUNCTIONS, HUMANS, IMAGES, LIGHT, LUMINANCE, MASKING, MODELS, MOTION, NONLINEAR ANALYSIS, NUMBERS, OBSERVERS, PROCESSING, PSYCHOPHYSICS, QUANTIZATION, RATES, RESOLUTION, SENSITIVITY, STATICS, TEST AND EVALUATION, VISIBILITY, ACUITY, COMPARISON, DISCRIMINATION, LEAD(METAL), METHODOLOGY, PREDICTIONS, QUALITY, SPECIFICATIONS, STIMULI.

IDENTIFIERS: (U) WUAFOSR2313A5, PE6110ZF, \*Image compression.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A257 933 CONTINUED

AD-A257 933

7/5

20/5

7/2

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Photodissociation Spectroscopy of Mg(+)-H2O.

AUG 92

7P

PERSONAL AUTHORS: Yeh, C. S.; Willey, K. F.; Robbins, D.  
L.; Pilgrim, J. S.; Duncan, M. A.

CONTRACT NO. AFOSR-91-0001, NSF-CHEM90-08248

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0818, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v198 n3/4 p233-238 Aug 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Mg(+)-H2O ion-molecule complexes are produced in a pulsed supersonic nozzle cluster source. These weakly bound complexes are mass selected and studied with laser photodissociation spectroscopy in a reflectron time-of-flight mass spectrometer system. An electronic transition assigned as 2B sub 2 yields X2A sub 1 is observed with an origin at 28389 cm(-1)(vac). The spectrum has a prominent progression in the metal-H2O stretching mode with a frequency of 517.1 cm(-1). An extrapolation of this progression fixes the excited state dissociation energy at 18008 cm(-1). The corresponding ground state value is 8732 cm(-1)(25.0 kcal/mol). The solvated bending mode and asymmetric stretching mode of water are also active in the complex. A second electronic transition assigned as 2B sub 1 - X2A sub 1 is observed with an origin at 30368 cm(-1) and a metal stretch frequency of 483.4 cm(-1). This study was guided by ab initio calculations by Bauschlicher and co-workers, which provide accurate predictions of the electronic transition energies, vibrational constants and dissociation energies.

DESCRIPTORS: (U) \*PHOTODISSOCIATION, \*SPECTROSCOPY, \*MAGNESIUM, \*IONS, \*WATER, REPRINTS, ION MOLECULE INTERACTIONS, COMPLEX IONS, NOZZLE CLUSTERS, PULSES,

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SUPERSONIC NOZZLES, LASERS, MASS SPECTROMETERS, ELECTRONICS, TRANSITIONS, METALS, FREQUENCY, EXCITATION, ENERGY, GROUND STATE, SOLVATION, VIBRATION, BENDING, CHEMICAL BONDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, Weakly bound complexes, Mass selection, Reflections, Stretching modes, Solvated bending modes, Ab initio calculations, Vibrational constants, Time of flight.

## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A257 921 7/4 20/5 12/1

## JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

## JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) The Study of Flux Redistribution During Molecular Photodissociation: Adiabatic and Diabatic Analyses and Application to the Dissociation of CH<sub>3</sub>I.

(U) Experimental Methods for Probing Structure and Dynamics of Gas-Phase Molecular Dications,

OCT 92 12P

MAY 92 11P

PERSONAL AUTHORS: Alexander, Millard H.; Rist, Claire; Manolopoulos, David E.

PERSONAL AUTHORS: Yokoyama, Kazushige; Szaflarski, Diane M.; Mullin, Amy S.; Lineberger, W. C.

CONTRACT NO. AFOSR-91-0363, NSF-CHE89-17543

CONTRACT NO. AFOSR-89-0074, F48620-92-J-0071

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B1

TASK NO. B1

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-92-0937, AFOSR

TR-92-0967, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97 n7 p4836-4845, 1 Oct 92. Available only to DTIC users. No copies furnished by NTIS.

Availability: Pub. in SPIE Volume 1638: Optical Methods for Time- and State-Resolved Chemistry, p264-272 May 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) This paper extends our new method for the study of the mechanism of molecular photodissociation. This method involves the time-independent study of the growth of photofragment flux, governed by photon absorption, and the subsequent redistribution of the flux, governed by the Hamiltonian in the excited, unbound state. The flux analysis can be coded out easily in either a diabatic (asymptotic), locally adiabatic, or fully adiabatic basis. The redistribution of the photofragment flux can be investigated in either internat state space or coordinate space at each excitation energy. Application is made to one- and two-dimensional models for the photodissociation of CH<sub>3</sub>I. Photodissociation.

ABSTRACT: (U) Coaxial ion-laser beam photofragmentation spectroscopy combined with coincidence detection is a powerful method for probing doubly charged molecular ions. The high-resolution photofragmentation spectra contain detailed information on the molecular structure and dissociation dynamics of doubly charged cations. Our study on N<sub>2</sub><sup>2+</sup> reveals detailed intramolecular interactions with other states, and also provides direct information on previously unobserved electronic states of this dication. We discuss these intramolecular interactions and the dissociation mechanism and demonstrate the high sensitivity of this technique. Photofragmentation spectra, Perturbation analysis predissociation lifetime.

DESCRIPTORS: (U) \*PHOTODISSOCIATION, \*MOLECULAR STRUCTURE, \*FLUX(RATE), \*DISTRIBUTION, \*METHYL RADICALS, \*IODIDES, ABSORPTION, COORDINATES, ENERGY, EXCITATION, MODELS, PHOTONS, TIME, TWO DIMENSIONAL, REPRINTS, ADIABATIC CONDITIONS.

DESCRIPTORS: (U) \*CATIONS, \*DYNAMICS, \*MOLECULAR IONS, \*MOLECULAR STRUCTURE, \*GASES, \*PHASE, DETECTION, DISSOCIATION, ELECTRONIC STATES, ELECTRONICS, HIGH RESOLUTION, HIGH SENSITIVITY, INTERACTIONS, IONS, LASER BEAMS, LASERS, PERTURBATIONS, RESOLUTION, SENSITIVITY, SPECTRA, SPECTROSCOPY, STRUCTURES, REPRINTS, EXPERIMENTAL DATA, LIFE CYCLES, NITROGEN, OXYGEN, PROBES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, Photofragments, Diabatic conditions, Methyl iodide.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A257 918 4/1

IDENTIFIERS: (U) PEB1102F, WJAFDSR2303B1, Coaxial, Photofragmentation, Coincidence, Probing, Doubly charged cations, \*Dications, Lifetimes.

HAYSTACK OBSERVATORY WESTFORD MA

(U) Radar-Satellite Studies of the High-Latitude Ionosphere.

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-31 Aug 92.

OCT 92 14P

PERSONAL AUTHORS: Foster, John C.

CONTRACT NO. AFOSR-89-0454

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0952, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Emphasis has been placed on the analysis of multi-instrument experiments investigating the physics of the auroral oval/polar cap boundary and the vicinity of the plasmapause and inner edge of the ring current at mid-latitudes utilizing existing data sets from Millstone Hill and other incoherent scatter radars and available satellite overflights and supporting ground-based information. Ionospheric signatures of the cusp and the mechanisms involved in large-scale plasma transport into the polar cap during magnetic storms have been investigated. Data from Air Force sensors on DMSP satellites have been combined with ground-based observations to examine intense oxygen ion outflow, localized intensifications of the convection electric field, and SAR arcs all of which occur equatorward of the main auroral enhancements during geomagnetic storms. The characteristics of the ring current and plasmasheet particle populations are closely coupled to these ionospheric phenomena. Radar, Multi-Instrument, Magnetosphere, Ionosphere.

DESCRIPTORS: (U) \*IONOSPHERE, \*MAGNETIC STORMS, \*OBSERVATION, \*POLAR CAP ABSORPTION, ARTIFICIAL SATELLITES, BOUNDARIES, CONVECTION(ATMOSPHERIC), ELECTRIC FIELDS, GROUND BASED, MAGNETOSPHERE, OVERFLIGHT, PARTICLES, POLAR CAP, POPULATION, RINGS, TRANSPORT, RADAR

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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REFLECTIONS.

PURDUE UNIV LAFAYETTE IN

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, Plasmopause.  
Geomagnetic storms, Auroral oval.

(U) Measurements of Atomic Sodium in Flames by  
Asynchronous Optical Sampling: Theory and Experiment,

MAY 92 17P

PERSONAL AUTHORS: Flechtner, Gregory J.; King, Galen B.;  
Laurendeau, Normand M.; Lytle, F. E.

CONTRACT NO. AFOSR-89-0051

PROJECT NO. 2308

TASK NO. 8S

MONITOR: AFOSR, XC  
TR-92-0921, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Applied Optics, v31 n15 p2849-2864,  
20 May 92. Available only to DTIC users. No copies  
furnished by NTIS.

ABSTRACT: (U) Asynchronous optical sampling (ASOPS) is a  
pump-probe method for the measurement of species  
concentrations in turbulent high-pressure flames. We show  
that rapid measurement of species number density can be  
achieved in a highly quenched environment by maintaining  
a constant beat frequency between the mode-locking  
frequencies of the pump and the probe lasers. A model for  
the ASOPS method based on rate equation theory for three-  
and four-level atoms is presented. A number of  
improvements are made to the basic ASOPS instrument,  
which result in a greatly enhanced signal to noise ratio.  
Atomic sodium is aspirated into an atmospheric pressure  
C2H4/O2/N2 flame and detected with the ASOPS instrument.  
When excited-state lifetimes are fitted by using the  
ASOPS theory, a 3p1,2,3/2 yields 3S1,1/2 quenching-rate  
coefficient of  $1.72 \times 10^9$  s-1 and a 3P3/2 yields 3P1/2  
doublet-mixing rate coefficient of  $3.88 \times 10^9$  s-1 are  
obtained, in excellent agreement with literature values.  
ASOPS signals obtained over a wide range of pump and  
probe beam powers validate the rate equation theory.  
Improvements are suggested to improve the signal to noise  
ratio. Since the present results are limited to laminar  
flows. Combustion, Spectroscopy, Quenching, Atomic sodium

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AD-A257 916

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lifetime.

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

DESCRIPTORS: (U) \*FLAMES, \*MEASUREMENT, \*SODIUM, \*ATOMIC PROPERTIES, AGREEMENTS, ATMOSPHERICS, ATOMS, BAROMETRIC PRESSURE, COEFFICIENTS, COMBUSTION, CONSTANTS, DENSITY, ENVIRONMENTS, EQUATIONS, FREQUENCY, HIGH PRESSURE, LASERS, MIXING, MODELS, NOISE, NUMBERS, PRESSURE, PROBES, PUMPS, QUENCHING, RATES, RATIOS, SAMPLING, SIGNAL TO NOISE RATIO, SIGNALS, SPECTROSCOPY, THEORY, VALUE, YIELD, REPRINTS, OPTICS, TURBULENCE, PRESSURE, CARBON, HYDROGEN, OXYGEN, NITROGEN, LAMINAR FLOW, DECAY, LASER INDUCED FLUORESCENCE, MODE LOCKED LASERS.

(U) Drop/Gas Interactions in Dense Sprays.

DESCRIPTIVE NOTE: Final rept. 15 Aug 89-14 Aug 92.

SEP 92 117P

PERSONAL AUTHORS: Hsiang, L.-P.; Wu, J.-S.; Mizukami, M.; Faeth, G. M.

CONTRACT NO. AFOSR-89-0516

IDENTIFIERS: (U) PEB1102F, WUAFOSR2308BS, \*Asynchronous optical sampling, Constant beat, ASOPS, Excited state lifetimes.

PROJECT NO. 2308

TASK NO. 85

MONITOR: AFOSR, XC  
TR-92-0961, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a final report of research considering three types of drop/gas interactions that are important in the near-injector, dense region of sprays, namely: (1) secondary drop breakup, which is an intrinsic outcome of primary breakup and is the most significant rate process of dense sprays; (2) turbulence generation by dispersed phases, which is the most significant source of turbulence production within dense sprays; and (3) the structure of sphere wakes at moderate Reynolds numbers, which is a fundamental property needed to understand turbulence generation. The properties of secondary breakup were observed for shock wave initiated disturbances in air at normal temperature and pressure, using pulsed shadowgraphy and holography to measure the dynamics and outcome of breakup and theories phenomenological theories to interpret and correlate the measurements. Particle-generated turbulence was observed using uniform fluxes of spherical particles falling through (in the mean) air, using phase-discriminating laser velocimetry to measure flow properties and stochastic analysis to interpret and correlate the measurements. The properties of sphere wakes at moderate Reynolds numbers were observed in both nonturbulent and turbulent environments, using laser velocimetry to measure flow properties and similarity theories to interpret and correlate the results.

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TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

DESCRIPTORS: (U) \*DROPS, \*MULTIPHASE FLOW, \*SPRAYS, DYNAMICS, ENVIRONMENTS, FLOW, HOLOGRAPHY, INJECTORS, INTERACTIONS, LASERS, MEAN, MEASUREMENT, NUMBERS, PARTICLES, PHASE, PRESSURE, PRODUCTION, RATES, REGIONS, SECONDARY, SPHERES, STRUCTURES, TEMPERATURE, TURBULENCE, UNIFORMS, WAKE.

(U) The Synthesis of Perfluorotrialkyl Orthoformates by Direct Fluorination.

92 13P

PERSONAL AUTHORS: Misna, T. E.; Lin, W. H.; Hovsepian, M. M.; Lagow, R. J.

IDENTIFIERS: (U) Multiphase flow, Sprays, Turbulence generation. WUAFOSR2308BS, PE81102F.

CONTRACT NO. AFOSR-89-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC  
TR-82-0933, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in European Jnl. of Solid State Inorganic Chemistry, v29 p807-918 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The low temperature gradient direct elemental fluorination of triethyl orthoformate, tri-n-propyl orthoformate, tri-n-butyl orthoformate, tri-n-pentyl orthoformate, tri-n-hexyl orthoformate and trimethoxyethyl orthoformate to produce the corresponding perfluorinated compounds is described. Direct fluorination, Orthoformates, Perfluorinated compounds, Perfluoropolyethers.

DESCRIPTORS: (U) \*FLUORINATION, GRADIENTS, LOW TEMPERATURE, TEMPERATURE, TEMPERATURE GRADIENTS, REPRINTS, SYNTHESIS, AMINES, OXYGEN, FORMATES, ALKYL RADICALS, POLYMERS.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, \*Perfluorotrialkyl orthoformates, Perfluoropoly ethers, Crown ethers.

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EAST CAROLINA UNIV SCHOOL OF MEDICINE GREENVILLE NC

transmitter release that may function to limit the overexcitation of hippocampal neurons.

(U) Presynaptic Modulation of the Hippocampal Mossy Fiber Synapse.

DESCRIPTORS: (U) \*FIBERS, \*SYNAPSE, \*HIPPOCAMPUS, ACIDS, ACTIVATION, CALCIUM, CHANNELS, CONTROL, FEEDBACK, FUNCTIONS, GUANINE, HYPOTHESES, INPUT, NERVE CELLS, NUCLEOTIDES, PEPTIDES, PROTEINS, RELEASE, TERMINALS, TRANSMITTERS, VOLTAGE, PLASTIC PROPERTIES, CYTOLOGY, IN VITRO ANALYSIS, GLUTAMIC ACID.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 91-14 Sep 92.

SEP 92 21P

PERSONAL AUTHORS: Terrian, David M.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A2, \*Presynaptic modulation, \*Hippocampal mossy fiber synapse.

CONTRACT NO. AFOSR-89-0531

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0947, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the first year of this research project, it was demonstrated that distinct of voltage-gated calcium channels are required for the exocytosis of glutamate and types dynorphin peptides. We were also to confirm that the release of glutamate from hippocampal mossy fiber terminals is regulated by a presynaptic receptor that is sensitive to L(+)-aminophosphonobutyric acid. In the second year of this research project we tested several specific hypotheses concerning presynaptic receptors and the autoregulation of the hippocampal mossy fiber synapse. Specifically, it was demonstrated that the transmitter(s) released from the mossy fiber terminals may mediate positive or negative feedback control of the mossy fiber synaptic input, under appropriate conditions, by activating presynaptic autoreceptors. Presynaptic facilitatory kainate receptors are hypothesized to enhance mossy fiber transmitter release through a mechanism that involves the activation of a guanine nucleotide-binding regulatory protein (Gs) that stimulates adenylyl cyclase and increases the activity of voltage-gated calcium channels. This presynaptic facilitation may contribute to hippocampal neurodegeneration produced by the plant-derived toxins kainate and domoate. The goal of our research during the third year has been to determine whether presynaptic inhibitory kappa opioid receptors exert an antagonistic influence on mossy fiber

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AD-A257 818 6/5

AD-A257 818 CONTINUED

ROCHESTER UNIV NY SCHOOL OF MEDICINE AND DENTISTRY

(U) Photic Regulation of Gene Expression and Cellular Activity in the SCN.

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-31 Aug 92.

OCT 92 16P

PERSONAL AUTHORS: Earnest, David J.

CONTRACT NO. AFOSR-90-0182

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0862, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) On the basis of their putative role in the process of stimulus-transcription coupling, immediate-early genes, such as c-fos and c-jun, have been implicated as important components of signal transduction programs by which environmental stimuli regulate long-term cellular events. To explore the possibility that immediate-early genes may play a similar role in the transduction of light signals mediating the entrainment of the circadian pacemaker in the suprachiasmatic nucleus (SCN), immediate-early gene expression in the SCN was examined in vivo and in vitro for evidence of circadian regulation by photic stimuli. Immunocytochemical and molecular analyses demonstrate that light has an inductive effect on the expression of c-fos mRNA and Fos protein in the SCN, but only at critical times during the circadian cycle when light is capable of modulating the period of the circadian pacemaker and mediating its entrainment. In addition, this circadian-dependent induction of c-fos expression in the SCN by light was mainly localized in the retinorecipient or ventrolateral subfield of the nucleus within a substantial portion of the GRP-containing neurons located in this region. These data provide evidence for the correlative relations between the induction of c-fos gene expression in the SCN and the modulation of the SCN circadian pacemaker by light and suggest that immediate-early genes may be

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components of the signal transduction cascade by which light entrains circadian rhythms.

DESCRIPTORS: (U) \*GENES, \*CELLS, \*ANTIBODIES, \*OPTIC NERVE, ADDITION, BIOLOGICAL RHYTHMS, CIRCADIAN RHYTHMS, CLOCKS, COUPLINGS, CYCLES, ENTRAINMENT, LIGHT, MODULATION, NERVE CELLS, OSCILLATION, PACEMAKERS, PROTEINS, RECREATION, REGIONS, REGULATIONS, SIGNALS, STIMULI, IN VIVO ANALYSIS, IN VITRO ANALYSIS, CYTOLOGY, NERVES, RADIOIMMUNOASSAY, SENSITIVITY, TIME, STIMULATION(PHYSIOLOGY), STIMULATION(GENERAL).

IDENTIFIERS: (U) Circadian Rhythms; Pacemaker; Biological Clock; Oscillation; Immediate-Early Genes; Signal Transduction; Entrainment, PE81102F, WUAFOSR2312A3.

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## DTIC REPORT BIBLIOGRAPHY

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SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY  
PENSACOLA FL

FLORIDA STATE UNIV TALLAHASSEE

(U) Assimilation of Selected PAH and PCB Congeners Sorbed  
to Sediment by Benthic Invertebrates.

(U) Statistical Aspects of Reliability, Maintainability,  
and Availability.

DESCRIPTIVE NOTE: Annual rept. 30 Nov 91-29 Nov 92.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-30 Sep 92.

NOV 92

8P

SEP 92

14P

PERSONAL AUTHORS: Lydy, Michael J.

PERSONAL AUTHORS: Hollander, Myles; Proschan, Frank

CONTRACT NO. AFOSR-89-0181

CONTRACT NO. AFOSR-91-0048

PROJECT NO. 2312

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-92-0914, AFOSR

TR-92-0955, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

ABSTRACT: (U) The research involved studies of the assimilation of polycyclic aromatic hydrocarbons and polychlorinated biphenyl congeners by an amphipod and a chironomid. Assimilation efficiencies were calculated for these species using radioactively labeled benzo(a)pyrene and hexachlorobiphenyl which was allowed to adsorb to sediment particles of various sizes. One conclusion of the research was that differential bioavailability of a chemical may not depend as much on the behavior of the organism as on the nature of the compound and its interaction with the sediment components.

DESCRIPTORS: (U) \*BIPHENYL, \*POLYCHLORINATED BIPHENYLS, \*INVERTEBRATES, ASSIMILATION, BEHAVIOR, CHEMICALS, EFFICIENCY, HYDROCARBONS, INTERACTIONS, PARTICLES, SEDIMENTS, TOXICOLOGY, CHEMISTRY, ENVIRONMENTS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A5, Benthic invertebrates, PAH(Polycyclic aromatic hydrocarbons), Diporeia, Aquatic toxicology, Polycyclic aromatic hydrocarbons.

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ABSTRACT: (U) During the first year period, Oct 1, 1990 - Sep 30, 1991, Co-Principal Investigators Myles Hollander and Frank Proschan and other researchers partially supported under Grant AFOSR-91-0048, produced 15 Technical Reports and 9 published papers. As an indication of the fundamental and innovative character of the research performed, it is pointed out that Co-Principal Investigator Frank Proschan received the Von Neumann Award (joint with R.E. Barlow, University of California, Berkeley) at the Joint Annual Meeting of the Operations Research Society of America/The Institute of Management Sciences, Nashville, May, 1991. During the final year period the researchers partially supported under the Grant, produced six technical reports, eight published papers, and one published book. As an indication of the type of problems encountered and the research undertaken under the auspices of the Reliability Center, Myles Hollander and Edsel Pena worked on inference concerning systems operating in different environments. This area was motivated by a specific problem suggested by Ed Delgado, Eglin AFB, FL and has far reaching applications. The problem is to use data from a system's performance under varied environments to predict the performance of the system under specified environmental conditions. For instance, space systems are tested in earth-based environments which purport to

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) A Comparison of 1H-13C Cross Polarization and Magic Angle Spinning Dynamics of the Alpha-, Beta- and Gamma-Cyclodextrin Inclusion Complexes of Benzaldehyde.

DESCRIPTORS: (U) \*RELIABILITY, \*STATISTICAL ANALYSIS, \*MAINTAINABILITY, \*AVAILABILITY, \*AIRCRAFT AWARDS, BOOKS, CALIFORNIA, ENVIRONMENTS, GRANTS, MANAGEMENT, OPERATION, OPERATIONS RESEARCH, SOCIETIES, SPACE SYSTEMS, UNIVERSITIES, WEAPONS.

92 9P

PERSONAL AUTHORS: Garces, Fred O.; Pushkara Rao, V.; Garcia-Garibay, M. A.; Turro, Nicholas J.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC  
TR-92-0817, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Supramolecular Chemistry, v1 p85-72 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The solid state inclusion complexes of benzaldehyde with beta, and alpha, gamma cyclodextrins have been studied by cross-polarization and magic angle spinning solid state NMR techniques (CPMAS-NMR). The effects of complexation on the mobility of the guest have been analyzed in terms of nuclear relaxation parameters such as C spin-lattice relaxation (T1), H spin-lattice relaxation in the rotating frame (T1(H)), and cross polarization transfer (TCH). It is proposed that large variations observed in the TCH values of the guest in the three complexes may be interpreted in terms of motion with correlation times in the range between c. 0.1-5.0 msec. These motions may strongly affect the extent of the heteronuclear dipolar coupling partially responsible in determining the rates of cross polarization. 1H-13C cross polarization, Magic angle spinning, Cyclodextrins, Spin-lattice relaxation.

DESCRIPTORS: (U) \*BENZALDEHYDES, \*CROSS POLARIZATION, ANGLES, CORRELATION, COUPLINGS, FRAMES, INCLUSIONS, MOBILITY, MOTION, PARAMETERS, POLARIZATION, RATES, RELAXATION, SOLIDS, TRANSFER, VALUE, VARIATIONS, REPRINTS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A257 620 CONTINUED

SOLID STATE CHEMISTRY, LATTICE DYNAMICS, PHOTOCHEMICAL REACTIONS, CARBON, HYDROGEN, PROTONS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR230382, \*Cyclodextrins, \*Magic angle, \*Spinning dynamics, Complexation, Nuclear relaxation, Heteronuclear dipolar, Rotating frames.

AD-A257 596 7/4 7/2 7/3 20/2

PITTSBURGH UNIV PA

(U) Oxidation of CO by Oxygen on a Stepped Platinum Surface: Identification of the Reaction Site.

APR 92 13P

PERSONAL AUTHORS: Szabo, Andras; Henderson, Michael A.; Yates, John T., Jr

CONTRACT NO. AFOSR-39-0384

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0918, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n8 p8191-8202, 15 Apr 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The coadsorption of oxygen and carbon monoxide on the stepped Pt (112) surface has been studied using electron stimulated desorption-ion angular distribution (ESDIAD), temperature programmed desorption (TPD), and low energy electron diffraction (LEED). It has been possible to preferentially adsorb different isotopic CO molecules on step and terrace sites, respectively, following oxygen adsorption on step sites to partial coverage. Transient kinetic experiments show that below approx. 200 K, isotopic CO present exclusively on terrace sites is more effectively involved in CO<sub>2</sub> production, compared to less reactive CO on the step sites. Above approx. 200 K, site exchange between step and terrace CO species prevents the measurement of the relative reactivity of the two kinds of chemisorbed CO. The results show that the elementary step producing CO<sub>2</sub> from adsorbed CO and adsorbed oxygen is structure sensitive, even though the overall catalytic reaction between CO and O<sub>2</sub> is generally classed as a structure insensitive reaction. Chemisorption, Carbon monoxide, Catalysis, Oxygen, Carbon dioxide, Active site.

DESCRIPTORS: (U) \*CARBON MONOXIDE, \*OXYGEN, \*SURFACES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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\*OXIDATION, \*PLATINUM, ADSORPTION, CARBON, CARBON DIOXIDE, CATALYSIS, CHEMISORPTION, DESORPTION, DIFFRACTION, DIOXIDES, DISTRIBUTION, ELECTRON DIFFRACTION, ELECTRONS, ENERGY, EXCHANGE, IONS, KINETICS, LOW ENERGY, MEASUREMENT, MOLECULES, MONOXIDES, PRODUCTION, REACTIVITIES, SITES, STRUCTURES, TEMPERATURE, TRANSIENTS, REPRINTS, CHEMICAL REACTIONS.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY  
(U) Radiochemical Assay of Adsorption at Single Crystal/  
Solution Interfaces.

SEP 92 8P

PERSONAL AUTHORS: Zelenay, Piotr; Wleckowski, Andrzej

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0838, AFOSR

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2, Isotopic  
molecules, Step sites, Terrace sites.

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Electrochemical Society,  
v139 n9 p2552-2558, Sep 92. Available only to DTIC users.  
No copies furnished by NTIS.

ABSTRACT: (U) By using a radioactive labeling method and electrochemistry, results were obtained that show that interactions of bisulfate anion with well-ordered single-crystal electrodes are different from those with the polycrystalline electrodes. In particular, the anion surface concentration on the polycrystalline rhodium electrode increases monotonically with the electrode potential and then decreases when the surface becomes electrooxidized. With Rh(111), the surface stability of bisulfate is observed in a broad electrode potential range. Likewise, the hydrogen adsorption process apparently overcomes a higher energy barrier to nucleate into surface water-bisulfate network on Rh(111) than it does on the polycrystalline surface. These findings, and the corresponding results obtained with platinum electrodes, demonstrate some unique electrochemical properties of electrode materials that have a regular atomic periodicity and a long-range crystallographic order. Extension of this work to surfaces covered by underpotential-deposited-metal (UPD) adlayers illustrates the principles of enhanced adsorption. That is, the anionic adsorption from solutions containing cationic UPD precursors is observed in the potential range where no anion adsorption occurs on the clean substrate surfaces.

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TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Molecular Dynamics Simulation of Liquid-Plastic Phase Transition of Cyclohexane in Porous Silica. 2.

OCT 92 7P

PERSONAL AUTHORS: Brodka, A.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XC  
TR-92-0931, AFOSR

UNCLASSIFIED REPORT

It is shown here for the first time that there are some inactive and active UPD metal adlayers toward adsorption. In the case of adsorption of bisulfate on platinum covered by UPD copper, it is concluded that in the inactive electrode potential range perchlorate successfully competes with bisulfate for the surface sites.

DESCRIPTORS: (U) \*ADSORPTION, \*ELECTROCHEMISTRY, \*SINGLE CRYSTALS, \*SOLUTIONS(MIXTURES), \*INTERFACES, \*RADIOCHEMISTRY, \*ASSAYING, ADATOMS, ANIONS, BARRIERS, BONDING, CATIONS, CHEMICALS, COPPER, CRYSTALS, ELECTRODES, ELECTROSTATICS, ENERGY, HYDROGEN, INTERACTIONS, MATERIALS, METALS, NETWORKS, NEUTRAL, OBSERVATION, PERCHLORATES, PERIODIC VARIATIONS, PLATINUM, POLYCRYSTALLINE, PRECURSORS, RHODIUM, SITES, STABILITY, SUBSTRATES, SURFACE WATERS, SURFACES, TIME, WATER, WORK, REPRINTS, NUCLEATION, SULFATES.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2303A1, Radioactive labeling, Bisulfates.

Availability: Pub. in Jnl. of Chemical Physics, v97 n8 p5876-5881, 15 Oct 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The liquid-plastic phase transition of cyclohexane in small pores sol-gel glass is studied by computer simulation. A cavity model is obtained by placing silica clusters at the corners of a cubic box. Two cavities of diameter of about 30 and 50 A are considered. Cyclohexane is approximated by an assembly of six Lennard-Jones potentials. Translational and rotational motions of cyclohexane are studied in the temperature range from 190 to 333 K. Supercooling is observed and the freezing temperature is depressed in comparison to the bulk phase. Molecular dynamics. Computer simulations, Cyclohexane, Restricted geometries, Sol-Gel Glass.

DESCRIPTORS: (U) \*CYCLOHEXANES, \*LIQUIDS, \*PHASE, \*PLASTICS, \*SIMULATION, ASSEMBLY, BOXES, CAVITIES, COMPUTERS, FREEZING, GELS, GLASS, MODELS, MOTION, PHASE TRANSFORMATIONS, SILICATES, SUPERCOOLING, TEMPERATURE, TRANSITIONS, REPRINTS, POROUS MATERIALS, THERMODYNAMICS, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PEB1103D, WJAFOSR3484RS, \*Molecular dynamics, Silica clusters, \*Porous silica, Pores, Restricted geometries, Rotational motion, Translational

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TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Molecular Dynamics Simulation of Liquid-Solid Phase Transition of Cyclohexane. 1.

OCT 92 8P

PERSONAL AUTHORS: Brodka, A.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XC  
TR-92-0930, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v87 n8 p5669-5675, 15 Oct 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Molecular dynamics simulations for the six-center Lennard-Jones model of C<sub>6</sub>H<sub>12</sub> are reported. The potential parameters have been adjusted to fit cyclohexane properties along the saturated vapor pressure curve. The behavior of cyclohexane molecules in the bulk liquid and in the plastic crystal state is studied. Satisfactory agreements between experimental data and calculated heat capacities, diffusion coefficient, rotational and angular velocity relaxation times, as well as radial distribution functions, are reported. Molecular dynamics, computer simulations, Cyclohexane, Restricted geometries, Sol-Gel Glass.

DESCRIPTORS: (U) \*CYCLOHEXANES, \*LIQUIDS, \*SIMULATION, \*SOLIDS, \*PHASE TRANSFORMATIONS, COEFFICIENTS, COMPUTERS, CRYSTALS, DIFFUSION, DIFFUSION COEFFICIENT, DISTRIBUTION, DISTRIBUTION FUNCTIONS, DYNAMICS, EXPERIMENTAL DATA, FUNCTIONS, GELS, GLASS, HEAT, MODELS, MOLECULES, PARAMETERS, PLASTICS, PRESSURE, RELAXATION, SILICATES, VAPOR PRESSURE, VAPORS, VELOCITY, REPRINTS, SATURATION, THERMODYNAMICS, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) WUAFOSR3484RS, PEB1103D, Lennard Jones model, \*Molecular dynamics, Rotational velocity, Angular

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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velocity, Radial, Restricted geometry, FCC(Face-Centered-Cubic) structure.

STATEN ISLAND COLL NY

(U) Role of Protein Phosphorylation in the Regulation of Neuronal Sensitivity.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-31 Jul 92.

JUL 92 13P

PERSONAL AUTHORS: Ehrlich, Yigal H.

CONTRACT NO. AFOSR-88-0290

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0881, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The project reported here focuses on the regulation of neuronal sensitivity by a novel class of protein kinase: an ecto-protein kinase which phosphorylates proteins at the cell surface by extracellular ATP. The progress we have made in this project includes the development of novel experimental paradigms for the determination of ecto-protein kinase and its substrates in cultured neuronal cells. We used these paradigms in the conclusive identification of the surface phosphoproteins in primary neurons cultured from embryonic brain and in PC 12 cloned neuronal cells induced to differentiate by nerve growth factor (NGF). We have determined which of these surface phosphoproteins are regulated by NGF. We have also identified a specific phosphorylation system at the surface-of CNS neurons involved in neurogenesis. These specific phosphoproteins are at the focus of continued studies on the role of ecto kinase in synaptic plasticity. A pilot investigation conducted as part of this project revealed that the naturally occurring ether-phospholipid Platelet Activating Factor (PAF) induces Long-Term Potentiation (LTP) in hippocampal slices, and may have an important modulatory role in the process of memory formation. Neuronal Phosphoproteins, Ecto-protein Kinases, Primary CNS neurons in-culture, Synaptic-plasticity, PC-12 cells, Nerve Growth Factor (NGF), Neuronal development, Long-

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A257 401 CONTINUED

term potentiation.

DESCRIPTORS: (U) \*PHOSPHORUS TRANSFERASES, \*NERVE CELLS, \*PHOSPHORYLATION, ADENOSINE PHOSPHATES, BRAIN, DETERMINATION, ETHERS, IDENTIFICATION, PHOSPHOPROTEINS, PLASTIC PROPERTIES, PROTEINS, REGULATIONS, SENSITIVITY, SUBSTRATES, SURFACES.

IDENTIFIERS: (U) NGF(Nerve Growth Factor), Protein phosphorylation, Protein kinase.

AD-A257 241 7/4 20/2 20/5 20/7

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) The International Symposium on Si-Based Molecular Beam (4th) held in Anaheim, California, on 29 April-3 May 1991.

DESCRIPTIVE NOTE: Final rept. 15 Apr 91-14 Apr 92.

APR 92 667P

PERSONAL AUTHORS: Ballance, John

CONTRACT NO. AFOSR-91-0247

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XC  
TR-92-0685, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Materials Research Society Symposium Proceedings, Volume 220 p1-651, 1991.

ABSTRACT: (U) Topics include: homoepitaxy and substrate preparation; doping; gas growth; gas optical properties; gas electronic transport; device applications; epitaxial metals and insulators; novel materials and growth techniques; and light from porous silicon.

DESCRIPTORS: (U) \*SILICON, \*MOLECULAR BEAMS, \*EPITAXIAL GROWTH, SYMPOSIA, HYDROGEN, PLASMAS(PHYSICS), METAL OXIDE SEMICONDUCTORS, FIELD EFFECT TRANSISTORS, SUBSTRATES, SCHOTTKY BARRIER DEVICES, SPECTROSCOPY, BORON, GERMANIUM, ABSORPTION, FILMS, CRYSTALS, SURFACES, ALLOYS, KINETICS, SUPERLATTICES, STRAIN(MECHANICS), OPTICAL PROPERTIES, PHOTONS, ERBIUM, RAMAN SPECTRA, HETEROJUNCTIONS, GASES, LOW TEMPERATURE.

IDENTIFIERS: (U) WUAFOSR2306B1, Homoepitaxy, Quantum wells, Chemical vapor deposition, Heterojunction bipolar transistors.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74L281

AD-A258 637 CONTINUED

AD-A258 637 6/5 7/3

SAN FRANCISCO STATE UNIV TIBURON CA ROMBERG TIBURON CENTERS

(U) Induction of Endonuclease-Mediated Apoptosis in Tumor Cells by C-nitroso-Substituted Ligands of Poly(ADP-ribose) Polymerase.

AUG 92 6P

PERSONAL AUTHORS: Rice, William G.; Hillyer, Christopher D.; Harten, Brad; Schaeffer, Catherine A.; Dorminy, Mark

CONTRACT NO. F49620-92-J-0232

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0886, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the National Academy of Sciences of the United States of America, v89 p7703-7707 Aug 92. Available to DTIC users only. No copies furnished by NTIS.

SUPPLEMENTARY NOTE: Original contains color plates. All DTIC reproductions will be in black and white.

ABSTRACT: (U) Novel C-nitroso compounds, 6-Nitroso-1,2-benzopyrone, and 3-nitrosobenzamide which inactivate the eukaryotic nuclear protein poly(ADP-ribose) polymerase (NAD<sup>+</sup>-poly(adenosine diphosphate D-ribose) ADP-D-ribosyl transferase, ADPRT, E.C. 2.4.2.30) at one zinc-finger site, completely suppressed the proliferation of leukemic and other malignant human cells and subsequently produced cell death. Tumoricidal concentrations of the drugs were relatively harmless to normal bone marrow progenitor cells and to superoxide formation by neutrophil granulocytes. The cellular mechanism elicited by the C-nitroso compounds consists of apoptosis due to DNA degradation by the nuclear calcium/magnesium-dependent endonuclease. This endonuclease is maintained in a latent form by poly-ADP-ribosylation, but inactivation of ADPRT by C-nitroso drugs derepresses the DNA-degrading activity. The ADP-D-ribosyl transferase protein is thus identified.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A256 415 CONTINUED

ARMED FORCES INST OF PATHOLOGY WASHINGTON DC

Hypoxia-Polyvinyl Alcohol Sponge Wound.

(U) The Effect of Hyperbaric Oxygen and Pentoxifylline on the Rate of Neovascularization in Mice.

DESCRIPTORS: (U) \*FIBROBLASTS, \*SUBCUTANEOUS TISSUE, \*HYPOXIA, \*GROWTH(PHYSIOLOGY), \*BLOOD VESSELS, ANIMALS, CONTROL, HYPEROXIA, IMPLANTATION, OXYGEN, PLACEBOS, PLANIMETRY, POLYMERS, POLYVINYL ALCOHOL, RELEASE, SPONGES, TENSION, HYPERBARIC CONDITIONS.

DESCRIPTIVE NOTE: Annual technical rept. Feb 90-Feb 92.

JAN 92 39P

IDENTIFIERS: (U) EGF(Epidermal Growth Factor), \*Neovascularization, PE61102F, WJAFDSR2312AS.

PERSONAL AUTHORS: Criswell, D. W.; Mehm, W. J.

CONTRACT NO. AFOSR-89-0543

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC  
TR-92-0910, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A polyvinyl alcohol sponge was implanted in mouse subcutaneous tissue to investigate two treatments INTERMITTENT HYPEROXIA (100% OXYGEN FOR 90 MINS TWICE A DAY AT 250 KPa) and epidermal growth factor (EGF) which may modulate fibroblast infiltration. Two conditions were established for treatment: exposure of animals to chronic hypoxia (12% oxygen for 23 hr/day), simulating low oxygen tensions in problem wounds, and normoxia (21% oxygen). In experiments evaluating EGF, sponges were implanted whose core contained EGF covered with a slow release polymer, the other group with placebo. Sponges were harvested at 15, 25, and 32 days after implantation. The area of the disc infiltrated by fibroblasts was measured by planimetry. After 32 days exposure to hypoxic conditions (7 days before sponge implantation and 25 days after) EGF slightly increased (NS) the area of fibroblast infiltration compared to placebo under both hypoxic and normoxic conditions. No significant differences were observed between the hypoxically conditioned groups and normoxic controls. Neither chronic hypoxia alone nor chronic hypoxia with intermittent hyperbaric oxygen administered 21-32 days after disc implantation affected the area of fibroblast infiltration. EGF significantly increased the area of the fibrous capsule around small PVA sponges after 15 days under normoxic conditions. Fibroblast-Hyperbaric Oxygen-

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A256 410 CONTINUED

AD-A256 410 20/11 20/4

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) Spatio-Temporal Complexity and Large-Scale Structures  
in Problems of Continuum Mechanics.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Aug 92.

AUG 92 18P

PERSONAL AUTHORS: Nicolaenko, Basil; Armbruster, Dieter;  
Eden, Alp; Kostelich, Eric

CONTRACT NO. AFOSR-89-0507

PROJECT NO. 3484

TASK NO. D7

MONITOR: AFOSR, XC  
TR-92-0902, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have investigated some difficulties in estimating dynamics from time-delay embeddings of experimental data that can be characterized as low-dimensional. A new procedure is developed to reduce noise by exploiting the properties of saddle periodic orbits on the reconstructed attractor. Most of these methods involve the estimation of a derivative from the data or in some way require a least squares estimate of the location of some portion of the attractor. Our work addresses some of the problems inherent in the estimation of dynamics from data, regardless of the type of model used to approximate the dynamics. These difficulties may arise from the fractal structure of the attractor and errors in all the observations. The problems persist regardless of the amount of available data and affect one's ability to determine an accurate local Model of the dynamics, even when an accurate model should be obtainable in principle. Many of these problems can be circumvented by using as much dynamical information as possible in the formulation of the statistical relationship between the observations. Our attempt to do this involves the use of recurrent orbits to derive an accurate linear model of the dynamics in the vicinity of saddle periodic orbits, on the attractor. We have applied our method to two experimental data sets from Taylor-

AD-A256 410

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Couette flows.

DESCRIPTORS: (U) \*COUETTE FLOW, \*CONTINUUM MECHANICS, \*TURBULENT FLOW, DELAY, DYNAMICS, ERRORS, ESTIMATES, EXPERIMENTAL DATA, FORMULATIONS, FRACTALS, MODELS, NOISE, OBSERVATION, ORBITS, STRUCTURES, TIME, EIGENVALUES, TRAJECTORIES, APPROXIMATION(MATHEMATICS), INERTIAL MEASUREMENT UNITS, REYNOLDS NUMBER.

IDENTIFIERS: (U) Attractors, Taylor Couette flow.

## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A258 400 6/13 7/3 23/1 9/1  
9/3 9/5

AD-A258 397 4/1

ARKANSAS UNIV AT PINE BLUFF SPACE AND ENVIRONMENT STUDIES  
LAB

YALE UNIV NEW HAVEN CT DEPT OF NEUROSURGERY

(U) Cytochemical Organization of the Retino-  
Suprachiasmatic System.

DESCRIPTIVE NOTE: Annual rept. 15 May 91-14 May 92.

AUG 92 38P

PERSONAL AUTHORS: Pol, Van D.

CONTRACT NO. AFOSR-90-0072

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0903, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) This document analyzes, calcium behavior of cultured cells from the SCN. Using digitally enhanced video imaging, we have studied the responses of both neurons and glial cells to glutamate and to several other substances found in the SCN. It has been taken several years to get the apparatus functioning, but we are now in a good position to make use of both the low light computer enhanced video system and the confocal laser scanning microscope to study the behavior of living SCN cells. One of the strong advantages of this approach is that single cells can be studied, or interacting groups of cells can be studied simultaneously.

DESCRIPTORS: (U) \*CALCIUM COMPOUNDS, \*NERVE CELLS, COMPUTERS, ENERGY, LASERS, MICROSCOPES, SCANNING, TELEVISION DISPLAY SYSTEMS.

IDENTIFIERS: (U) PB1102F, WUAFOSR2312A3, Retino-suprachiasmatic system, SCN(Suprachiasmatic Nuclei), Computer enhanced video system, Confocal laser scanning microscope, Glial cells.

AD-A258 400

UNCLASSIFIED

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DESCRIPTIVE NOTE: Annual rept. 1 Jul 91-30 Jun 92.

SEP 92 34P

PERSONAL AUTHORS: Miah, M. A.

REPORT NO. SESC-UAPB-01-92

CONTRACT NO. F49620-89-C-0071

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0897, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) A study of the temporal variation of quasi-trapped proton population near the geomagnetic equator reveals that the peak value of the equatorially mirroring component may increase by a factor of 50 or more between a solar maximum and a minimum conditions. During a solar maximum condition more hydrogen escape to outer space than during a minimum condition. The escaping light gas may cause more neutral generation by charge exchange interaction with the radiation belt/ring current protons, thereby enhancing the quasi-trapped proton population at equatorial thermospheric altitude. This reported result is based on the observation of quasi-trapped proton population in 1989-70, 1982, and 1984-86 by AZUR, S81-1, and EXOS-C missions. Also, a study based on EXOS-C mission alone shows that the peak flux profile of protons precipitate in the equatorial, and low-latitude, midlatitude, and auroral zones lying to the north of the equator, exist in parallel with the minimum magnetic field equator. Further, proton (0.84-35 MeV) and electron (0.19 - 3.2 MeV) population in the said midlatitude zone show longitude and altitude dependences. Contrary to previous observations, the locations of the peak flux profiles in all the three zones in L space depend upon

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A256 385 20/4

LEHIGH UNIV BETHLEHEM PA DEPT OF MECHANICAL ENGINEERING  
AND MECHANICS

the pitch of the particles.

DESCRIPTORS: (U) \*PROTONS, \*RADIATION BELTS, \*CHARGE  
DENSITY, ALTITUDE, ELECTRONS, EXCHANGE, HYDROGEN,  
INTERACTIONS, LATITUDE, LONGITUDE, MAGNETIC FIELDS,  
MISSIONS, NEUTRAL, OBSERVATION, PEAK VALUES, POPULATION,  
PRECIPITATES, PROFILES, REGIONS, RINGS.

(U) White Paper on the AFOSR Supermaneuverability Workshop  
Held in Bethlehem, Pennsylvania on 9-10 April 1992.

DESCRIPTIVE NOTE: Final rept. 1 Nov 91-31 Jul 92.

IDENTIFIERS: (U) PE81102F, WUAFOSR2310A2.

SEP 92 9P

PERSONAL AUTHORS: Rockwell, Donald

CONTRACT NO. F49620-92-J-0085

PROJECT NO. 2307

TASK NO. CS

MONITOR: AFOSR, AC  
TR-92-0878, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This workshop promoted the exchange of  
information among researchers currently studying unsteady  
aerodynamics at high angle-of-attack and provided a basis  
for identification of the major, unresolved issues in  
this area. Detailed technical presentations were given  
covering AFOSR's 8.1 Trial in Unsteady Aerodynamics,  
namely Quasi-Two-Dimensional Unsteady Flows, Three-  
Dimensional Unsteady Flows and the Control of Unsteady  
Flows. High angle of attack, unsteady flows.

DESCRIPTORS: (U) \*AERODYNAMICS, \*UNSTEADY FLOW, ANGLE OF  
ATTACK, ANGLES, ATTACK, CONTROL, COVERINGS, EXCHANGE,  
HIGH ANGLES, IDENTIFICATION, THREE DIMENSIONAL, TWO  
DIMENSIONAL, WORKSHOPS, FIGHTER AIRCRAFT.

IDENTIFIERS: (U) PE81102F, WUAFOSR2307CS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A256 382 CONTINUED

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND  
BIOCHEMISTRY

(U) Anisotropic Diffusion of Hydrogen Atoms on the Si(100)-  
2 X 1 Surface.

92 9P

PERSONAL AUTHORS: Wu, Christine J.; Carter, Emily A.

CONTRACT NO. AFOSR-89-0108

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC  
TR-92-0907, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physical Review B, v46 p4651-4658  
1992. Available only to DTIC users. No copies furnished  
by NTIS.

ABSTRACT: (U) This paper presents first-principles total-  
energy calculations of hydrogen-adatom diffusion on a  
Si(100)-2 x 1 reconstructed surface. The transition  
states for hydrogen-atom-diffusion pathways were  
established by mapping out the potential energy of a  
hydrogen atom jumping between the dangling bonds of a  
Si(100)-2x1 surface modeled by embedded finite silicon  
clusters. The diffusion barriers are high (2-3 eV) and  
wide (approx. 3-4 Angstrom), suggesting that H-atom  
diffusion on Si(100) proceeds via mostly a classical  
hopping mechanism instead of tunneling. Furthermore,  
diffusion of hydrogen atoms is predicted to be  
anisotropic, being preferentially directed parallel to  
the silicon-dimer rows, with an activation energy of 2.0  
eV. Higher activation energies of 2.5 and 2.7 eV are  
predicted for diffusion perpendicular to dimer rows, for  
the cases of hydrogen atoms hopping from one dangling  
bond to a neighboring dangling bond on the same dimer and  
on an adjacent dimer, respectively. The mechanism for H-  
atom diffusion along dimer rows is markedly different  
from that previously proposed for Si-adatom diffusion on  
Si(100); H atoms are predicted to diffuse along edges of  
the dimer rows rather than down the middle.

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DESCRIPTORS: (U) \*ATOMS, \*DIFFUSION, \*HYDROGEN, \*SILICON,  
\*SURFACES, \*ANISOTROPY, ACTIVATION, ACTIVATION ENERGY,  
ADATOMS, BARRIERS, DIMERS, ENERGY, MAPPING, POTENTIAL  
ENERGY, REPRINTS, TRANSITIONS, TUNNELING, KINETICS,  
CHEMICAL REACTIONS.

IDENTIFIERS: (U) WUAFOSR2303FS, PE81102F, Dangling bonds,  
Hopping mechanism, Perpendicular, Clusters, Total energy  
calculations.

## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A256 381 7/4 20/5

AD-A256 380 7/4 20/5 20/10

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND  
BIOCHEMISTRYCALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND  
BIOCHEMISTRY

(U) Pseudospectral Full Configuration Interaction.

(U) First-Principles-Derived Dynamics of a Surface  
Reaction: Fluorine Etching of Si(100).

AUG 92 6P

92 5P

PERSONAL AUTHORS: Martinez, Todd J.; Mehta, Aseem; Carter,  
Emily A.PERSONAL AUTHORS: Weekliem, Paul C.; Wu, Christine J.;  
Carter, Emily A.

CONTRACT NO. AFOSR-89-0108

CONTRACT NO. AFOSR-89-0108

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. FS

TASK NO. XC

MONITOR: AFOSR, XC  
TR-92-0906, AFOSR

MONITOR: AFOSR, XC

TR-92 0905, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97 n3  
p1878-1880, 1 Aug 92. Available only to DTIC users. No  
copies furnished by NTIS.

Availability: Pub. in Physical Review Letters, v69 p200-203  
1992. Available to DTIC users only. No copies furnished  
by NTIS.

ABSTRACT: (U) A pseudospectral formulation of the full  
configuration interaction method is p in this paper. This  
represents the first application of the pseudospectral  
approximation to configuration interaction expansions. It  
is shown that a formal scaling advantage of  $n$ , the number  
of molecular orbital basis functions, is achieved. The  
spectral and pseudospectral total energies obtained for a  
series of first-row atoms and ions are compared. The  
relative operation counts of the spectral and  
pseudospectral methods are also discussed in this paper.  
Finally, two hybrid spectral/ pseudospectral  
approximations that vastly improve the accuracy of the  
pseudospectral total energies are presented.

ABSTRACT: (U) We present a realistic simulation of the  
dynamics of fluorine with Si(100). Isothermal molecular  
dynamics simulations, using an analytic many-body  
potential fit to first-principles quantum mechanical  
adsorbate-surface and experimental gas phase data, show  
the initial buildup of the fluorosilyl layer necessary  
for etching. Several aspects of the microscopic mechanism  
are revealed. These simulations represent the first time  
that first-principles-derived surface reaction dynamics  
have been carried out; we show that this approach is  
critical to obtaining physically correct results. We  
present a realistic simulation of the reaction of  
fluorine with Si(100). Isothermal molecular dynamics  
simulations, using an analytic many-body potential fit to  
first-principles quantum mechanical adsorbate-surface and  
experimental gas phase data, show the initial buildup of  
the fluorosilyl layer necessary for etching. Several  
aspects of the microscopic mechanism are revealed. These  
simulations represent the first time that first-  
principles-derived surface reaction dynamics have been  
carried out; we show that this approach is critical to  
obtaining physically correct results.

DESCRIPTORS: (U) \*CONFIGURATIONS, \*INTERACTIONS,  
ACCURACY, ATOMS, CHEMICALS, EXPANSION, FORMULATIONS,  
FUNCTIONS, IONS, MOLECULAR ORBITALS, NUMBERS, OPERATION,  
PHYSICS, REPRINTS, ELECTRONS, HARTREE FOCK APPROXIMATION.

IDENTIFIERS: (U) WJAFOSR2303FS, PEB1102F,  
\*Pseudospectral approximation, Basis functions,  
CI(Configuration Interaction), \*Electronic structure  
calculations, GVB(Generalized Valence Bond).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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HARVARD UNIV CAMBRIDGE MA

DESCRIPTORS: (U) \*ETCHING, \*FLUORINE, \*SURFACE REACTIONS, \*SILICON, ADSORBATES, APPROACH, BODIES, DYNAMICS, LAYERS, PHASE, REPRINTS, SIMULATION, SURFACES, TIME, GASES, WAFERS, MELTING.

(U) Solid-Hexatic-Liquid Phases in Two-Dimensional Charge-Density Waves.

DESCRIPTIVE NOTE: Scientific paper.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303FS, \*First principles derived dynamics, Isothermal molecular dynamics, Fluorosity, Quantum mechanics.

SEP 92 5P

PERSONAL AUTHORS: Dai, HonaJie; Lieber, Charles M.

CONTRACT NO. AFOSR-90-0028

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0804, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physical Review Letters, v89 n10 p1576-1579, 7 Sep 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The structural order of the two-dimensional (2D) charge-density-wave (CDW) phase in Nb Ta 1-xS2 materials has been determined as a function of impurity concentration from the quantitative analysis of scanning tunneling microscopy images. We show that the CDW phase evolves through crystalline, hexatic glass, and liquidlike states as the impurity concentration in the lattice increases to  $x = 0.10$ . These results address systematically the structural manifestations of quenched disorder in 2D systems.

DESCRIPTORS: (U) \*LIQUID PHASES, \*SOLIDS, \*TWJ DIMENSIONAL, CHARGE DENSITY, DENSITY, FUNCTIONS, GLASS, IMAGES, IMPURITIES, LIQUIDS, MATERIALS, MICROSCOPY, PHASE, QUANTITATIVE ANALYSIS, REPRINTS, SCANNING, TUNNELING, WAVES, NIOBIUM, TANTALUM, SULFUR, LATTICE DYNAMICS, SOLID STATE CHEMISTRY.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A2, \*Hexatic phase, Crystalline glass, Quenched disorder, \*CDW(Charge Density Waves), FLL(Flux Line Lattice).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A256 378 11/8.2 7/4 20/5 9/1

AD-A256 375 20/5 4/1

HARVARD UNIV CAMBRIDGE MA

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Machining Oxide Thin Films with an Atomic Force  
Microscope: Pattern and Object Formation on the  
Nanometer Scale.

(U) Photodissociation Dynamics of Cluster Ions.

DESCRIPTIVE NOTE: Final rept. 15 Nov 88-14 Nov 91.

DESCRIPTIVE NOTE: Scientific paper.

SEP 92 8P

JUL 92 5P

PERSONAL AUTHORS: Bowers, Michael T.

PERSONAL AUTHORS: Kim, Yun; Lieber, Charles M.

CONTRACT NO. AFOSR-89-0102

CONTRACT NO. AFOSR-90-0029

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B1

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0899, AFOSRMONITOR: AFOSR, XC  
TR-92-0803, AFOSR

UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Science, v257 p375-377, 17 Jul 92.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) There are two somewhat different  
objectives of this grant, unified by their common  
interest in clusters. We have made substantial progress  
both in photodissociation of atmospheric clusters (11  
papers) and in the generation and reactivity of  
semiconductor and metallic clusters (7 papers). Of  
particular interest is our development of a new ion  
chromatography technique that allows determination of the  
shape of clusters, or other species, in the gas phase.

ABSTRACT: (U) An atomic force microscope (AFM) has been  
used to machine complex patterns and to form free  
structural objects in thin layers of MoO<sub>3</sub> on the surface  
of MoS<sub>2</sub>. The AFM tip can pattern lines with 10-nanometer  
resolution and then image the resulting structure without  
perturbation by controlling the applied load. Distinct  
MoO<sub>3</sub> structures can also be defined by AFM machining, and  
furthermore, these objects can be manipulated on the MoS<sub>2</sub>  
substrate surface with the AFM tip. These results suggest  
application to nanometer-scale diffraction gratings, high-  
resolution lithography masks, and possibly the assembly  
of nanostructures with novel properties.

DESCRIPTORS: (U) \*IONS, \*PHOTODISSOCIATION, \*MOLECULAR  
COMPLEXES, \*ATMOSPHERIC PHYSICS, CHROMATOGRAPHY,  
DETERMINATION, DYNAMICS, REACTIVITIES, SHAPE.

IDENTIFIERS: (U) Photodissociation, Ions, Clusters,  
PE81102F, WUAFOSR230381, Ion Clusters.

DESCRIPTORS: (U) \*MACHINING, \*OXIDES, \*THIN FILMS,  
ASSEMBLY, DIFFRACTION, FILMS, GRATINGS(SPECTRA), HIGH  
RESOLUTION, IMAGES, LAYERS, LITHOGRAPHY, MACHINES, MASKS,  
MICROSCOPES, PATTERNS, PERTURBATIONS, REPRINTS,  
RESOLUTION, SCALE, STRUCTURES, SUBSTRATES, SURFACES,  
MOLYBDENUM, SULFIDES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A2, \*Atomic force  
microscope, Object formation, Nanometer scales..

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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NEW YORK UNIV NY CENTER FOR NEURAL SCIENCE

MONITORS, MONKEYS, MOTION, NERVE CELLS, PULSES,  
SPECIFICATIONS, STIMULI, TARGETS, VISION.

(U) Higher Order Mechanisms Of Color Vision.

IDENTIFIERS: (U) Vision, Psychophysics, Color,  
Discrimination, Thresholds, Isoluminance PE81102F,  
WUAFOSR2313A5, Color mechanisms.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-14 Jun 92.

SEP 92 12P

PERSONAL AUTHORS: Krauskopf, John

REPORT NO. TR-2

CONTRACT NO. AFOSR-89-0429

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XC  
TR-92-0877, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers work from June 15, 1989 to June 14, 1992. The main accomplishments have been: (1) Completion and publication of a comprehensive study of the effects of chromatic content, blur and contrast of targets on vernier acuity and on stereo acuity; (2) The use of a new method of measuring chromatic discrimination under conditions of constant adaptation and the publication of reports on this work; (3) Experiments on the significance of color in the perception of motion; (4) Experiments on the effects of chromatic adaptation on color matching; (5) The effects of noise masks on the detection of chromatic and luminance pulses; (6) Continuation of the study of the chromatic properties of single cells in the monkey cortex extending our experiments to Area V2; (7) Experiments on the effects of chromatic adaptation on the responses of single neurons in monkey LGN to chromatic stimuli; and (8) The development of a new system for making displays for visual experiments on TV monitors which allows at least 12 bits of accuracy in the specification of the intensity of each of the three primaries.

DESCRIPTORS: (U) \*COLOR VISION, \*PSYCHOPHYSICS, ACCURACY, ACUITY, ADAPTATION, COLORS, CONTRAST, DETECTION, DISCRIMINATION, INTENSITY, LUMINANCE, MASKS, MATCHING.

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NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) Experimental and Theoretical Investigation of Surface Chemistry Induced by Direct and Indirect Electronic Excitation.

DESCRIPTIVE NOTE: Final rept. Aug 88-Jan 92.

AUG 92 68P

PERSONAL AUTHORS: Garrett, S. J.; Stair, Peter C.; Wertz, Eric

CONTRACT NO. AFOSR-88-0297

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0898, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A combined theoretical and experimental investigation of the photochemistry of methyl iodide on rutile at 100-110 K has been attempted in order to assess the importance of each of the possible direct or indirect photon absorption processes. We have used x-ray photoelectron spectroscopy (XPS), temperature programmed desorption (TPD) and a UHV chamber designed for 257-351 nm laser irradiation of the adlayer followed by time-of-flight mass spectrometry (TOF-MS). We have observed that following irradiation, methyl photofragments are ejected into the vacuum. These photofragments possess a characteristic translational energy distribution extending up to 1.9 eV in the case of 257 nm radiation, which varies somewhat with photodissociation wavelength and methyl iodide coverage. Two broad peaks are visible in the translational energy distribution corresponding to methyl fragments with energies of 1.1 and 0.03 eV. The higher energy fragments are produced with a relatively narrow angular distribution and some vibrational excitation in the  $v'=1$  and  $v'=2$  'umbrella' modes of the methyl radical, whilst those of low translational energy are produced with a much broader angular distribution and almost no population in either of the  $v'$  vibrational mode  $v'=1$  and  $v'=2$ .

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DESCRIPTORS: (U) \*EXCITATION, \*SURFACE CHEMISTRY, \*ELECTRONICS, ABSORPTION, CHAMBERS, DESORPTION, DISTRIBUTION, ENERGY, FRAGMENTS, IODIDES, IRRADIATION, LASERS, MASS, MASS SPECTROMETRY, METHYL RADICALS, PHOTOCHEMICAL REACTIONS, PHOTODISSOCIATION, PHOTOELECTRONS, PHOTONS, RADIATION, RUTILE, X RAY SPECTROSCOPY, TEMPERATURE, TIME, VACUUM, X RAY PHOTOELECTRON SPECTROSCOPY, X RAYS, ULTRAHIGH VACUUM, TITANIUM DIOXIDE, ADSORBATES, CRYSTAL STRUCTURE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A2, Adlayers.

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MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

NEW YORK UNIV MEDICAL CENTER NY DEPT OF PHYSIOLOGY AND BIOPHYSICS

(U) Research in Programming Languages and Software Engineering.

(U) Biophysical and Biochemical Mechanisms in Synaptic Transmitter Release.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-30 Jun 92,

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Jan 92,

SEP 92 13P

JAN 92 71P

PERSONAL AUTHORS: Basili, Victor R.; Gannon, John D.; Zeikowitz, Marvin V.

PERSONAL AUTHORS: Llinas, Rodolfo R.

CONTRACT NO. AFOSR-90-0031

CONTRACT NO. AFOSR-89-0270

PROJECT NO. 2304

PROJECT NO. 2312

TASK NO. A2

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0900, AFOSRMONITOR: AFOSR, XC  
TR-92-0901, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the activities during the period May 1, 1991 through June 30, 1992. The following three sections describe results from three major activities: a risk-based model of software decision making, construction of models for software development processes, and verification of safety properties of software requirements specifications.

DESCRIPTORS: (U) \*SOFTWARE ENGINEERING, \*PROGRAMMING LANGUAGES, RESEARCH MANAGEMENT, MODELS, COMPUTER PROGRAM VERIFICATION, SPECIFICATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

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ABSTRACT: (U) The initial question addressed in 1989 was that of synaptic vesicle movement as determined by direct microscopic visualization. This research demonstrated that vesicles were actually mobilized from the point of injection in the axon to the active zones, i.e. the place where synaptic transmitter is released. It was also found that a change in either oxygenation or the surface properties of vesicles can lead to no movement or, to change in movement direction. The second aspect of synapse work performed that year was a demonstration of the category of calcium channel that is responsible for transmitter release. The work in 1990 demonstrated that miniature potentials could be modulated in the squid synapse by injection of Synapsin I and of protein kinase II. In the third year of the grant, 1991, the first demonstration of calcium microdomains in synaptic transmission was performed.

DESCRIPTORS: (U) \*SYNAPSE, \*NERVE TRANSMISSION, CALCIUM, CEPHALOPODA, CHANNELS, DEMONSTRATIONS, GRANTS, INJECTION, NERVE CELLS, PHOSPHORUS TRANSFERASES, PROTEINS, REGIONS, RELEASE, SURFACE PROPERTIES, SURFACES, TRANSMITTERS, WORK, BIOPHYSICS, BIOCHEMISTRY, FRAGMENTS, POTENTIAL ENERGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, Synaptic

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transmitter release.

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WISCONSIN UNIV-MADISON DEPT OF ELECTRICAL AND COMPUTER  
ENGINEERING

(U) Computation and Communication Constraints for  
Distributed Estimation Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 May 80-30 Jun  
92.

JUN 92 68P

PERSONAL AUTHORS: Gubner, John A.

CONTRACT NO. AFOSR-80-0181

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC  
TR-92-0875, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research performed under this grant fall into four areas which are reflected in Published papers:  
(1) J.A. Gubner, 'Random Coding for the Constrained Multiple-Access Arbitrarily Varying Channel,' Proc. Twenty-Eighth Annual Allerton Conf. Commun. Contr. Comput., Univ of Illinois, Urbana, IL, pp. 684-690, Oct. 1990.  
'The Capacity Region of the Additive Multiple-Access Arbitrarily Varying Channel,' Proc. 1991 IEEE Int. Symp. Inform. Theory, Budapest, Hungary, P. 218, June 1991.  
'On the Capacity Region of the Discrete Additive Multiple-Access Arbitrarily Varying Channel,' IEEE Trans. Inform. Theory, vol 38, no4, pp.1344-1347, July 1991 - concerned arbitrarily varying channels. (2) 'Distributed Estimation and Quantization,' IEEE Trans. Inform. Theory, submitted 1992, and W.H. Welch, 'Quantization for Distributed Estimation Systems,' M.S. report, Dep. Elect. Comp. Eng., University of Wisconsin, Madison, 1992 focussed on the design of distributed estimation systems subject to communication and computation constraints (3) 'On the Computation of Shot-Noise Probability Distributions,' Transform Theory, submitted 1992, and R.E. Sequeira, J.A. Gubner and B.E.A. Saleh, 'Image Detection Under Low-Level Illumination,' IEEE Trans. Image Proc., in press, concerned the computation of shot-noise probability

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distributions and image detection based on shot-noise observations. (4) J.A. Gubner and W.B. Chang. 'Wavelet Transforms for Discrete-Time Periodic Signals,' IEEE Trans.Signal Proc., submitted 1992 is a tutorial paper on wavelet transforms for discrete-time periodic signals.

DESCRIPTORS: (U) \*COMPUTATIONS, \*ESTIMATES, ACCESS, ADDITIVES, CHANNELS, CODING, DETECTION, DISTRIBUTION, GRANTS, HUNGARY, ILLINOIS, IMAGES, LOW LEVEL, NOISE, OBSERVATION, PAPER, PROBABILITY, QUANTIZATION, REGIONS, SHOT NOISE, SIGNALS, THEORY, TIME, UNIVERSITIES, WISCONSIN, PROBABILITY DISTRIBUTION FUNCTIONS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

WISCONSIN UNIV-MADISON WATER CHEMISTRY PROGRAM  
(U) Molecular Properties and Fate of Organic Chemicals.  
DESCRIPTIVE NOTE: Annual rept. 15 Aug 88-14 Aug 90,

AUG 90 34P  
PERSONAL AUTHORS: Andren, Anders W.  
CONTRACT NO. AFOSR-88-0301  
PROJECT NO. 2312  
TASK NO. A4  
MONITOR: AFOSR, XC  
TR-92-0808, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objectives for this project is to improve and evaluate present assessment procedures which are designed to predict the transport and fates including degradation pathways, of compounds of interest to the Air Force sphere. Specifically, our subobjectives may be summarized to: (1) Continue to update and improve aqueous solubility octanol-water partition coefficient, and vapor pressure predictive techniques as new property data appear in the literature. (2) Study the effect of co-solvents, co-solutes, colloids, and temperature on aqueous solubility of solutes of interests and evaluate/develop thermodynamic, semiempirical, and empirical predictive schemes. (3) Evaluate and develop structure-activity relationships to predict rates, mechanisms, and extent of environmental abiotic and biotic degradation of chemicals of environmental interest. (4) Provide realistic computer generated compound behavior profiles for a variety of these compounds. In this progress report we address what we feel are the most important environmental degradation pathways in addition to direct photolysis, namely liquid phase homogeneous and heterogeneous OH radical reactions. We have focussed our attention on chlorinated aromatic hydrocarbons (chlorobenzene), since these compounds cover a broad range of compounds that are of environmental interest.

DESCRIPTORS: (U) \*AROMATIC HYDROCARBONS, \*PHOTOLYSIS,

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AIR FORCE, CHEMICALS, CHLOROBENZENE, COLLOIDS, COMPUTERS, DEGRADATION, HYDROCARBONS, LIQUID PHASES, LIQUIDS, SOLUBILITY, SOLUTES, THERMODYNAMICS, VAPOR PRESSURE, VAPORS, WATER.

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Stability and Adaptation of Neural Networks.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4, Assessment Procedures, Degradation Pathways, Aqueous solubility, Semiperical predictive scheme, Empirical predictive scheme, Liquid phase homogeneous oxygen/hydrogen radical reactions, Liquid phase heterogeneous reactions, Abiotic degradation, Biotic degradation.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Dec 91,

SEP 92 120P

PERSONAL AUTHORS: Kosko, Bart

CONTRACT NO. AFOSR-88-0236

PROJECT NO. 2305

TASK NO. 83

MONITOR: AFOSR, XC  
TR-92-0885, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research studied the stability, adaptation, and robustness of neural networks and fuzzy systems. Key results include the stability of random adaptive bidirectional associative memories (RABAMs) and neural-fuzzy competitive and differential-Hebbian ABAMs, the introduction and analysis and testing of the differential competitive learning law, new theorems on the stochastic convergence of competitive learning for vector quantization, a universal approximation theorem for fuzzy systems, unsupervised schemes for Teaming fuzzy rules with neural networks with tests on truck-and-trailer control systems and coding and compression of still images and image sequences. Neural networks, unsupervised learning, robustness, stability, competitive learning, fuzzy systems, neural-fuzzy systems, phoneme recognition, image compression, truck and-trailer control systems.

DESCRIPTORS: (U) \*NEURAL NETS, ADAPTATION, CODING, COMPRESSION, CONTROL, CONTROL SYSTEMS, CONVERGENCE, IMAGES, LEARNING, NETWORKS, PHONEMES, QUANTIZATION, RECOGNITION, SEQUENCES, STABILITY, TEST AND EVALUATION, THEOREMS, TRAILERS, TRUCKS, OPERATIONAL EFFECTIVENESS, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3, \*Fuzzy systems,

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Robustness.

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9/5

FLORIDA UNIV ALACHUA ADVANCED MATERIALS RESEARCH CENTER

(U) Ultrastructure Processing and Environmental Stability  
of Advanced Structural and Electronic Materials.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Jul 92.

AUG 92 119P

PERSONAL AUTHORS: Hench, Larry L.

CONTRACT NO. F49620-88-C-0073

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0853, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goals of this Multi-Investigator Research Program (MIRP) are: (1) achieve an understanding of the science of ultrastructure processing, and (2) apply the science of ultrastructure processing to produce new optical, electronic, optoelectronic, and structural materials. Ultrastructure processing refers to the manipulation and control of chemistry based processes to attain a new generation of high performance materials. Problem areas to benefit from ultrastructure processing include: advanced optical and opto-electronic systems, non-linear optical matrices, laser hosts, controlled particulates, transpiration cooled optics, effects of energetic particle beams, electronic behavior of high band gap semiconductors. Six projects are pursued. A cumulative list of the 60 papers published and 11 patents submitted during this contract is presented. A few papers from each project published during 1991-92 are presented. Project A: Sol-Gel Processing Science. Three papers describe the physical chemical factors and structural evolution and characterization of the sol-gel processing of large SiO<sub>2</sub> monoliths. Real time monitoring of the drying behavior of large silica gels is reported. A third paper reports on sol-gel derived titania-silica glasses with FTIR and structural characterization. glass, surfaces, optics, ultrastructure, infrared reflection

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spectroscopy, microstructure, gels, gel-glass transformation, processing, composites, silica, noise, powders, superlattices, metal organic precursors, drying, thermal.

CORNELL UNIV ITHACA NY

(U) Wall Layers.

DESCRIPTIVE NOTE. Final rept. 15 Jan 89-14 Jan 92,

DESCRIPTORS: (U) \*PROCESSING, \*SILICA GELS, \*COMPOSITE MATERIALS, \*CERAMIC MATERIALS, \*SILICA GLASS, BEHAVIOR, BENEFITS, CHEMICALS, CHEMISTRY, CONTRACTS, CONTROL, DRYING, ELECTRONICS, EYEGLASSES, GELS, GLASS, LASERS, MATERIALS, METALS, MICROSTRUCTURE, MONITORING, NOISE, OPTICS, PAPER, PARTICLE BEAMS, PARTICLES, PARTICULATES, PATENTS, POWDERS, PRECURSORS, REAL TIME, REFLECTION, SEMICONDUCTORS, SPECTROSCOPY, SUPERLATTICES, SURFACES, TIME, TRANSFORMATIONS, TRANSPIRATION, ELECTROOPTICS, OPTICAL MATERIALS, AIR FORCE RESEARCH, BIOCHEMISTRY, PHOTONICS, STRUCTURAL PROPERTIES, OPTICAL PROPERTIES.

JAN 92 38P

PERSONAL AUTHORS: Lumley, John L.; Leibovich, Sidney; Holmes, Philip; Guckenhelmer, John

CONTRACT NO. AFOSR-89-0228

PROJECT NO. 2307

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-0857, AFOSR

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, Advanced materials, \*Sol-gel.

UNCLASSIFIED REPORT

ABSTRACT: (U) Narrative reports are presented, of progress during each of the three contract years, together with lists for each year of publications and reports, presentations and various professional responsibilities of the principal investigators. turbulence, dynamical systems, modeling, control, drag reduction, mixing.

DESCRIPTORS: (U) \*TURBULENT BOUNDARY LAYER, \*NAVIER STOKES EQUATIONS, DRAG REDUCTION, MIXING, TURBULENCE, EQUATIONS, BOUNDARY LAYER CONTROL, JET MIXING FLOW, VISCOELASTICITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR230785.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS

TEXAS CHRISTIAN UNIV FORT WORTH

(U) Goals Versus Algorithms.

(U) Adsorption and Diffusion of Small Molecules in Porous Sol-Gel Glass.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Jun 92.

JUN 92 13P

92 12P

PERSONAL AUTHORS: Huber, Peter J.

PERSONAL AUTHORS: Zerda, T. W.

REPORT NO. PHJ-91-2

CONTRACT NO. AFOSR-90-0165

CONTRACT NO. AFOSR-89-0412

PROJECT NO. 3484

PROJECT NO. 2304

TASK NO. CS

TASK NO. A5

MONITOR: AFOSR, XC

TR-92-0840, AFOSR

MONITOR: AFOSR, XC  
TR-92-0860, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Computational methods in statistics often are defined through an algorithm. It is argued that a precise finite sample specification of the goals to be achieved by the algorithm is at least equally important. The issues are discussed in the special case of Projection Pursuit Regression. An interesting initial result of this work, which is still in progress, is that the Friedman-Stuetzle algorithm appears to be systematically biased toward overfitting.

DESCRIPTORS: (U) \*ALGORITHMS, \*STATISTICAL PROCESSES, \*SPECIFICATIONS, \*STATISTICS, \*WORK, \*STATISTICAL SAMPLES, \*FITTING FUNCTIONS(MATHEMATICS), \*BIAS.

IDENTIFIERS: (U) WUAFOSR2304A5, PB81102F.

Availability: Pub. in Chemical Processing of Advanced Materials, p103-113 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Interactions between adsorbents and silica surfaces determine two vibrational relaxation processes, intramolecular energy dissipation and vibrational dephasing, reorientational ally relaxation in the first and probably in the second adsorbed layer, the structure of the adsorbed layers, and finally the diffusion rate. Surface interactions are not limited to hydrogen bonding and are also important for liquids-that usually are assumed to be inert solvents.

DESCRIPTORS: (U) \*ADSORBENTS, \*ADSORPTION, \*DIFFUSION, \*GLASS, \*LIQUIDS, \*AVAILABILITY, \*BONDING, \*CHEMICALS, \*DISSIPATION, \*ENERGY, \*GELS, \*HYDROGEN, \*INTERACTIONS, \*LAYERS, \*MATERIALS, \*MOLECULES, \*PROCESSING, \*RATES, \*RELAXATION, \*REPRINTS, \*SOLVENTS, \*STRUCTURES, \*SURFACES, \*FLUID MECHANICS, \*SOLUTIONS(GENERAL), \*CATALYSIS, \*OPTICAL PROPERTIES.

IDENTIFIERS: (U) \*Sol-gel, WUAFOSR3484CS, PB81102F, \*Small molecules, Porous, Silica surfaces, Vibrational, Intramolecular, Dephasing, Molecular dynamics, Vycor glass, Zeolites, Pores.

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MASSACHUSETTS GENERAL HOSPITAL BOSTON WELLMAN LABS OF  
PHOTOMEDICINE

(U) Optical Probes for Laser Induced Shocks.

DESCRIPTIVE NOTE: Final rept. 15 Mar 90-14 Mar 92,

MAR 92 39P

PERSONAL AUTHORS: Deutsch,

CONTRACT NO. AFOSR-90-0210

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0893, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) The support provided by the grant AFOSR-90-0210 has resulted in the publication of four papers and three conference proceedings. Our research covered three topics. (SEE REPORT FOR PROCEEDINGS).

DESCRIPTORS: (U) \*PULSED LASERS, \*SHOCK WAVES, DOCUMENTS, GRANTS.

IDENTIFIERS: (U) WUAFOSR2301A1, PE61102F.

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INDIANA UNIV AT BLOOMINGTON INST FOR THE STUDY OF HUMAN  
CAPABILITIES

(U) Institute for the Study of Human Capabilities.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92,

AUG 92 74P

PERSONAL AUTHORS: Watson, Charles S.

CONTRACT NO. AFOSR-90-0215

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XC  
TR-92-0852, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) We continue to make significant progress toward our long-term goals. The Institute maintains an inter-laboratory, work-station based computer network. A third conference was held during this funding period, on March 25-27, 1992, again on the subject of Human Error. During the funding period, the university completed rehabilitation of three buildings for use in Institute-related research. Andrew Dillon, from the Human Sciences and Advanced Technology Research Institute in Loughborough, England, collaborated with several groups at the university on human-computer interactions. The Institute has provided partial support of research leading to the publication, during the past year, of 48 journal articles and book chapters, and the presentation of 28 papers at meetings of scientific societies, described in this report.

DESCRIPTORS: (U) \*COGNITION, \*PERFORMANCE(HUMAN), \*HUMAN FACTORS ENGINEERING, BUILDINGS, COMPUTER NETWORKS, COMPUTERS, ERRORS, HUMANS, LABORATORIES, NETWORKS, REHABILITATION, STATIONS, UNIVERSITIES, PSYCHOLOGY, WORK, WORK STATIONS, VISION, DECISION MAKING.

IDENTIFIERS: (U) WUAFOSR3484A4AS, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A258 034 13/8 11/10 20/5

ARKANSAS UNIV FOR MEDICAL SCIENCES LITTLE ROCK

(U) NMR Imaging of Elastomeric Materials.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Jun 92.

AUG 92 43P

PERSONAL AUTHORS: Komoroski, Richard A.; Sarkar, Subhendra N.; Wooten, E. W.

CONTRACT NO. AFOSR-89-0418

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0865, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) NMR imaging has been applied to elastomeric materials of industrial and military interest. The T2 spin-spin relaxation times of common elastomers, particularly after filling and curing, are sufficiently short that spin-echo sequences at submillisecond echo times cannot produce T2-independent images. The sensitivity to T2 makes spin echo imaging a good probe of elastomer blend composition, as demonstrated for a series of filled, cured cis-polybutadiene, styrene-butadiene rubber blends. The technique can distinguish good and bad carbon black dispersion in actual tire tread samples. The configuration of non-metallic tire cord, voids, rubber layer boundaries, apparent migration of additives, and other inhomogeneities can be detected in end-product tire samples. Arrowhead patterns, arising from magnetic susceptibility differences for defects in carbon-black-filled elastomers, were attributed to graphitized 'coke' particles from the carbon black. NMR images were obtained for porous glass disks of different porosities as models of materials such as oil cores. The mottled appearance often seen for such images is attributed largely to insufficient signal-to-noise ratio, and not pore structures. Comparison of spin-echo and gradient-echo images demonstrates the defect-magnification effect of the gradient-echo sequence seen previously for elastomers. The advantages of volume imaging, isotropic voxels in

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thin slices, and higher resolution are demonstrated for porous materials. defects, composites, spin echo, lithium-7, fluorine-19, carbon nuclear magnetic resonance, imaging, elastomers, tires, black, interfaces, curing, filler, NMR imaging, relaxation coke.

DESCRIPTORS: (U) \*ELASTOMERS, \*NUCLEAR MAGNETIC RESONANCE, \*RUBBER, \*TIRES, \*TREADS, ADDITIVES, BUTADIENES, CARBON, CARBON BLACK, COMPARISON, CONFIGURATIONS, CORES, CURING, DISKS, DISPERSIONS, ECHOES, FILLERS, FILLING, FLUORINE, GLASS, GRADIENTS, IMAGES, INTERFACES, LITHIUM, MAGNETIC PROPERTIES, MAGNETIC RESONANCE, MIGRATION, MIXTURES, MODELS, NOISE, OILS, PARTICLES, PATTERNS, POLYBUTADIENE, POROUS MATERIALS, PROBES, RELAXATION, RESONANCE, SENSITIVITY, SIGNAL TO NOISE RATIO, STYRENES, VOIDS, VOLUME, MILITARY APPLICATIONS, INDUSTRIAL RESEARCH, POLYMERS, DEFECTS(MATERIALS).

IDENTIFIERS: (U) Cis-Polybutiene.

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POLYTECHNIC INST OF NEW YORK FARMINGDALE WEBER RESEARCH  
INST

INTERACTIONS, MATERIALS, MICROWAVES, MILLIMETER WAVES,  
OPTICS, PHYSICS, RADIATION, SOLIDS, UNIVERSITIES,  
WAVEGUIDES, WORK.

(U) Basic Research in Electronics (USEP).

DESCRIPTIVE NOTE: Final technical rept.,

DEC 91 54P

PERSONAL AUTHORS: Kunhardt, Erich

REPORT NO. POLY-WRI-1600-91

CONTRACT NO. F48629-88-C-0075

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR, XC  
TR-92-0895, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Technical Report presents the work accomplished for the Joint Services Electronics Program (JSEP) under the contract no. F48620-88-C-0075. The Joint Services Electronics Program at Polytechnic University is the core of interdisciplinary research in electronics encompassing programs in the Department of Electrical Engineering, Physics, and Chemistry under the aegis of the Weber Research Institute. The research encompassed by this program is grouped under two broad categories: The research encompassed by this program is grouped into two broad categories: Interactions of Wide-Band Electromagnetic Radiation with Complex Macro- and Micro-Structures (EM) and Field-Particle Interactions in Matter: Single Particle, Collective and Cooperative Phenomena (FP). The detailed projects (research units) comprising the complete program are listed in the Table of Contents. Electromagnetics, microwaves, millimeter waves, waveguides and antennas, optics, solid state interactions and materials.

DESCRIPTORS: (U) \*ELECTROMAGNETIC RADIATION, \*PARTICLES, \*STRUCTURES, \*COUPLING(INTERACTION), \*SUPERCONDUCTIVITY, \*ELECTROMAGNETIC FIELDS, ANTENNAS, CHEMISTRY, CONTRACTS, CORES, ELECTRICAL ENGINEERING, ELECTRONICS, ENGINEERING,

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GRAND RIVER BASIN COORDINATING COMMITTEE DETROIT MI

(U) Chemical Kinetic and Aerodynamic Structures of Flames. STRUCTURES, SUPERSONIC COMBUSTION, TRANSFER, THERMOCHEMISTRY, COMPUTATIONS, ADIABATIC CONDITIONS, TURBULENCE, RADIATIVE TRANSFER.

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-28 Feb 92.

IDENTIFIERS: (U) PE61102F, WUAFQSR2308BS, Asymptotic analysis.

JUN 92 77P

PERSONAL AUTHORS: Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-0894, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) The objective of the present program was to study the aerothermochemical structure of laminar premixed and nonpremixed-flames through (a) non-intrusive experimental determination in reduced and elevated pressure environments, (b) computational simulation using detailed flame and kinetic codes, and (c) asymptotic analysis with simplified and reduced mechanisms. Useful theoretical and experimental contributions were made on the determination of the burning rates and flame kinetics of the lower hydrocarbons, on the understanding of the physical and chemical parameters influencing soot formation in diffusion flames, on the identification of the role of kinetics and system non-adiabaticity in flammability limits, and on adiabatic flame stabilization. These results are relevant to the fundamental and practical issues of flame kinetics, turbulent combustion, soot formation, radiative heat transfer, flame extinction, stabilization and flammability, and supersonic combustion. Flammability limit, flame extinction, hydrocarbon combustion, chemical kinetics, flame stabilization, soot formation, turbulent combustion.

**DESCRIPTORS:** (U) \*COMBUSTION, \*FLAMES, \*KINETICS, \*AERODYNAMICS, BURNING RATE, CHEMICALS, DETERMINATION, DIFFUSION, ENVIRONMENTS, EXTINCTION, FLAMMABILITY, HEAT, HEAT TRANSFER, HYDROCARBONS, IDENTIFICATION, PARAMETERS, PRESSURE, RATES, SIMULATION, SOOT, STABILIZATION.

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AD-A256 014 CONTINUED

CALIFORNIA UNIV LOS ANGELES MENTAL RETARDATION RESEARCH CENTER

(U) Intracellular Physiology of the Rat Suprachiasmatic Nucleus: Electrical Properties, Neurotransmission, and Effects of Neuromodulators.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-30 Jun 92.

AUG 92 128P

PERSONAL AUTHORS: Dudek, F. E.

CONTRACT NO. AFOSR-90-0058

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0858, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this research has been to gain an understanding of the neurophysiology of the suprachiasmatic nucleus (SCN), with emphasis on intrinsic electrical properties, synaptic and non-synaptic transmission, and neuromodulation. We have studied the role of excitatory and inhibitory amino acids (i.e., glutamate and GABA) in fast synaptic transmission. Our work has provided strong evidence that these transmitters mediate most, if not all, of the synaptic potentials in SCN neurons. Experiments with extracellular recordings indicate that a circadian rhythm of electrical activity persists after pharmacological blockade of these transmitter systems. Intracellular recordings showed that the intrinsic membrane properties are not homogeneous across the SCN, that some neurons have low-threshold Ca(2+) spikes and inward rectification, and that the firing pattern depends on firing rate. We have recently found that synchronous bursts of action potentials can occur in the SCN after chemical synapses have been blocked with low-calcium solutions and amino-acid-transmitter antagonists. Finally, we have continued to study the suprachiasmatic and paraventricular nuclei and the preoptic area of the hypothalamus, thus allowing a direct comparison between the SCN and other areas of the

hypothalamus. Our experiments should provide a rigorous understanding of how neurotransmitters, local neuronal circuits and intrinsic membrane properties regulate the electrical activity of neurons in the SCN and other hypothalamic areas. Hypothalamus, GABA, suprachiasmatic nucleus, excitatory amino acids, glutamate, electrophysiology.

DESCRIPTORS: (U) \*ELECTRICAL PROPERTIES, \*NERVE CELLS, \*NEUROPHYSIOLOGY, \*NEUROTRANSMITTERS, ACIDS, AMINO ACIDS, CALCIUM, CHEMICALS, CIRCADIAN RHYTHMS, CIRCUITS, COMPARISON, ELECTROPHYSIOLOGY, FIRING RATE, GAIN, HYPOTHALAMUS, MEMBRANES, NUCLEI, PATTERNS, RATES, RUPTURE, SPIKES, SYNAPSE, TRANSMITTERS, WORK.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A3, \*Intracellular physiology, \*Suprachiasmatic nucleus, \*Neuromodulators, GABA(Gamma amino Butyric Acid), PVN(Paraventricular Nucleus), SON(Suprachiasmatic Nucleus).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A258 010 CONTINUED

GEORGIA UNIV ATHENS DEPT OF PHARMACOLOGY AND TOXICOLOGY

(U) Interspecies Extrapolations of Halocarbon Respiratory and Tissue Kinetics: Applications to Predicting Toxicity in Different Species.

DESCRIPTIVE NOTE: Annual rept. no. 1, 15 Jul 91-14 Jul 92.

SEP 92 280P

PERSONAL AUTHORS: Dallas, Cham E.

CONTRACT NO. AFOSR-91-0356

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0851, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A series of experiments have been conducted to provide a pharmacokinetic data base for interspecies comparisons and for formulation and validation of physiologically-based pharmacokinetic models. The basic experimental design has involved giving equal doses of halocarbons to the rat and the dog, two species of widely different size. Perchloroethylene (PCE), tetrachloroethane (TET), trichloroethylene (TCE), and trichloroethane (TRI) have been employed as test chemicals. In order to evaluate the relative importance of the physicochemical property of volatility on the kinetics and toxicity of halocarbons. The respiratory elimination of TCE and systemic uptake of TCE and PCE has been measured in rats. In order to determine the dose received in target organs and other tissues, serial samples of brain, liver, kidney, lung, heart, skeletal muscle, and adipose tissue have been taken and analyzed for halocarbon content after administration of PCE, TET, and TRI in rats, and PCE and TET in dogs. A neurobehavioral operant testing system has been set up and a protocol established for monitoring the central nervous system effects of halocarbons. Neurobehavioral studies have been conducted following oral and inhalation exposure to PCE, and from inhalation exposure to TRI in rats. The direct measurements of halocarbon

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concentrations in exhaled breath and tissues have provided an extensive data base that will be used to formulate and validate the physiologically-based pharmacokinetic (PBPK) models for exposure to halocarbons. Physiologically based pharmacokinetic models, interspecies extrapolations, halocarbons, neurobehavioral measurements, operant testing, central nervous system depression toxicodynamic model.

DESCRIPTORS: (U) \*KINETICS, \*TOXICITY, \*RESPIRATION, ADIPOSE TISSUE, BRAIN, CENTRAL NERVOUS SYSTEM, CHEMICALS, PHYSIOLOGY, COMPARISON, DATA BASES, DOGS, DYNAMICS, ELIMINATION, EXPERIMENTAL DESIGN, FORMULATIONS, HEART, INHALATION, KIDNEYS, EXTRAPOLATION, LIVER, LUNG, MANAGEMENT, MEASUREMENT, MODELS, MONITORING, TISSUES(BIOLOGY), MUSCLES, NERVOUS SYSTEM, PHARMACOKINETICS, PHYSICOCHEMICAL PROPERTIES, RATS, TARGETS, TEST AND EVALUATION, LABORATORY ANIMALS, TRICHLOROETHANES, TRICHLOROETHYLENE, VALIDATION, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312AS, Halocarbons, Neurobehavioral measurements.

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AD-A256 006 CONTINUED

RUTGERS - THE STATE UNIV PISCATAWAY NJ DEPT OF  
ELECTRICAL AND COMPUTER ENGINEERING

(U) Query Optimization and Planning in Object-Oriented  
Knowledge Bases.

problems into several classes so that each class can be  
solved individually and efficiently. With this approach,  
each class of planning problems can be constructed as a  
problem model and included in the general problem solving  
system.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-31 Dec 91,

AUG 92 77P

DESCRIPTORS: (U) \*OPTIMIZATION, \*KNOWLEDGE BASED SYSTEMS,  
\*INTERROGATION, APPROACH, COMPUTER PROGRAMMING, DATA  
BASES, FORMULATIONS, GRAPHS, INPUT, MODELS, OPERATION,  
OUTPUT, PLANNING, PROBLEM SOLVING, SPECIALIZATION,  
SPECIFICATIONS, STORES.

PERSONAL AUTHORS: Sheu, Phillip

CONTRACT NO. AFOSR-90-0004

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A2.

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XC

TR-92-0858, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of the project entitled 'Query  
Planning and Optimization in Object-oriented Knowledge  
Bases' sponsored by AFOSR-90-0004 is to extend a  
deductive object base with knowledge-based problem  
solving and planning, which is intended to realize the  
concept of very-high level programming in a database  
system. The input to such a system is a specification of  
the problem to be solved (as a set of goals) and the  
output is a solution of the problem, where the knowledge-  
based problem solving system deals with problems that do  
not change the state of a database and the planning  
system processes goals that require some state changes in  
the database. In our approach, the knowledge-based  
problem solving system stores a set of problem models  
(such as graph problems) so that an input problem can be  
matched through an object-oriented specialization/  
generalization process. If no problem models can be  
matched by a given problem, the user should be provided  
with a high-level programming system that allows a top-  
down problem solving process be carried out until some  
matches can be found at detailed implementation stages.  
For the planning system, we have realized that most of  
the conventional approaches based on the formulation of  
operations-preconditions-postconditions have been proved  
to be inefficient. We have classified general planning

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AD-A256 004 CONTINUED

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Final rept. for period ending 14 May 92.

JUL 92 81P

PERSONAL AUTHORS: Dimotakis, Paul E.; Broadwell, James E.; Leonard, Anthony

CONTRACT NO. AFOSR-90-0304

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-0874, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this research is to conduct fundamental investigations of turbulent mixing, chemical reaction and combustion processes in turbulent, subsonic and supersonic flows. Our approach has been to carry out a series of detailed theoretical and experimental studies of turbulent mixing in both free shear layers and axisymmetric jets. To elucidate molecular transport effects, experiments and theory concern themselves with both reacting and non-reacting flows of liquids and gases, in fully-developed turbulent flows, i.e., in moderate to high Reynolds number flows. The computational studies are, at present, focused at fundamental issues pertaining to the computational simulation of both compressible and incompressible flows. Modeling has been focused on both shear layers and turbulent jets, with an effort to include the physics of the molecular transport processes, as well as formulations of models that permit the full chemical kinetics of the combustion process to be incorporated. Our primary diagnostic development efforts are currently focused on data-acquisition electronics to meet very high-speed, high-volume data requirements, the acquisition of single, or a sequence, of two-dimensional images, and the acquisition of data from arrays of supersonic flow sensors. Progress has also been made in the development of a dual-beam laser interferometer/

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correlator to measure convection velocities of large scale structures in supersonic shear layers and in a method to acquire velocity field data using pairs of scalar images closely spaced in time. Turbulence, shear layers, jets, mixing, combustion, numerical simulation, fractals, turbulent mixing modeling, velocimetry.

DESCRIPTORS: (U) \*CHEMICAL REACTIONS, \*COMBUSTION, \*MIXING, \*TURBULENT FLOW, ACQUISITION, APPROACH, ARRAYS, AXISYMMETRIC, CHEMICALS, CONVECTION, CORRELATORS, DATA ACQUISITION, ELECTRONICS, FLOW, FORMULATIONS, FRACTALS, IMAGES, INTERFEROMETERS, KINETICS, LASERS, LAYERS, LIQUIDS, MODELS, NUMBERS, PHYSICS, REQUIREMENTS, REYNOLDS NUMBER, SCALE, SEQUENCES, SIMULATION, STRUCTURES, SUPERSONIC FLOW, THEORY, TIME, TRANSPORT, TURBULENCE, TWO DIMENSIONAL, VELOCITY, VOLUME, MOLECULAR STRUCTURE, GAS DETECTORS, NITROGEN OXIDES, SUBSONIC FLOW, JET FLAMES.

IDENTIFIERS: (U) Shear layers, Jets, Computational studies, Compressible flows, Velocimetry, \*Molecular transport effects.

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YALE UNIV NEW HAVEN CT DEPT OF CHEMICAL ENGINEERING

AD-A255 999 CONTINUED

mass transport, thermophoresis, agglomerates, Brownian diffusion.

(U) Transport Phenomena and Interfacial Kinetics in Multiphase Combustion Systems. Revision.

DESCRIPTORS: (U) \*TRANSPORT, \*COMBUSTION, \*INTERFACES, \*KINETICS, AGGLOMERATES, BOUNDARY LAYER, CHEMICAL REACTIONS, CHEMICALS, COMBUSTORS, CURVATURE, DEPOSITION, DIFFUSION, ENGINEERING, FLAMES, HIGH TEMPERATURE, INERTIA, LABORATORIES, LAYERS, MASS, MORPHOLOGY, PARTICLES, PHASE, RADIATION, REPRINTS, SOOT, STRUCTURES, SYNTHESIS, TARGETS, TEMPERATURE, THESES, INFRARED RADIATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308BS, Thermophoresis, Brownian diffusion, Laminar counterflow, Sooting diffusion flames, Coagulation dynamics, Chemical vapor deposition, Aggregated particles.

DESCRIPTIVE NOTE: Annual technical rept. 15 Feb 91-14 Feb 92,

AUG 92 68P

PERSONAL AUTHORS: Rosner, Daniel E.

CONTRACT NO. AFOSR-91-0170

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-0890, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Mar 92.

ABSTRACT: (U) This annual technical report summarizes Yale High Temperature Chemical Reaction Engineering Laboratory research activities (under Grant AFOSR 91-0170) for the one-year period ending 14 February 1992. Among our research results described in detail in the cited references (Section 5). Perhaps the most noteworthy are the development of: R1 rational correction factors to account for the effects of suspended particle morphology on convective diffusion mass deposition rate's R2 quantitative criteria for influence of particle thermophoresis on the structure of two-phase laminar counterflow diffusion flames (potentially useful to predict IR radiation from such flames and optimize particle properties in synthesis applications) R3 quantitative methods for predicting/correlating the effects of particle inertia on thermophoretic deposition across laminar boundary layers on targets with streamwise curvature (experimentally verified by our seeded micro-combustor experiments on concave ribbon targets) 15 presentations and 2 PhD dissertations have resulted from this research program. Copies of 3 reprints appearing during this period are included in the Appendices (Section 6) of this report. Soot, aggregated particles,

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AD-A255 983 20/3

PRINCETON UNIV NJ DEPT OF MATHEMATICS

HOWARD UNIV WASHINGTON DC

(U) Macroscopic Properties of Random and Quasiperiodic Media.

(U) The Center for Nonlinear Phenomena and Magnetic Materials.

DESCRIPTIVE NOTE: Final rept. 1 Apr 90-31 Jul 92,

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Sep 92,

JUL 92 13P

SEP 92 33P

PERSONAL AUTHORS: Golden, Kenneth

PERSONAL AUTHORS: Gill, Tepper L.

CONTRACT NO. AFOSR-90-0203

CONTRACT NO. F49620-89-C-0079

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A4

TASK NO. A4

MONITOR: AFOSR, XC  
TR-92-0859, AFOSR

MONITOR: AFOSR, XC  
TR-92-0854, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) In a series of papers, we have proven new, fundamental rigorous results about the critical behavior of percolation models. In the discrete case, for a hierarchical model of the conducting backbone, we have proven inequalities on the critical exponent for the conductivity of the random resistor network. Our inequality less than or equal to 2 in three dimensions rules out roughly one fourth of the numerical estimates published over the last 25 years.

ABSTRACT: (U) We have proved existence and obtained estimates for the (finite) Hausdorff and fractal dimensions of global (maximal compact) attractors for the Landau-Lifschitz equations. These are the fundamental equations of the classical theory ferromagnetism. In order to obtain more detailed information about these attractors, we are currently developing approximation methods based on the theory of inertial manifolds. Inertial manifolds are finite dimensional manifolds which attract all solutions at an exponential rate. They contain the global attractor and have the advantage that they are manifolds whereas the attractors generally are not (they can be complicated fractal sets). The equations reduce to a finite-dimensional system of O.D.E.'s on the inertial manifolds. There is a class of calculational methods that have been developed in recent years, called nonlinear or modified Galerkin methods, which are closely related to the concept of inertial manifold and which are especially useful for the long-time integration of nonlinear differential equations. In the usual Galerkin approach, solutions of the nonlinear equation are sought in linear manifolds  $P_N$  which are spanned by the eigenfunctions of a linear operator which occurs in the problem. In the case of the Landau-Lifschitz equations, this is the Laplacian.

DESCRIPTORS: (U) \*CONDUCTIVITY, \*MODELS, \*PERCOLATION, ESTIMATES, INEQUALITIES, NETWORKS, RESISTORS, MEDIA, SEMICONDUCTORS, CERMETS, THERMISTORS, THICK FILMS, POROSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4, \*Macroscopic properties, \*Random, \*Quasiperiodic media, Superconducting composites.

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DESCRIPTORS: (U) \*FERROMAGNETISM, \*FRACTALS, \*THEORY, EIGENVECTORS, ESTIMATES, INTEGRATION, NONLINEAR DIFFERENTIAL EQUATIONS, RATES.

PRINCETON UNIV NJ DEPT OF CHEMISTRY

(U) Gas-Solid Dynamics at Disordered and Adsorbate Covered Surfaces.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4, Strange attractors.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-30 Sep 91.

SEP 92 27P

PERSONAL AUTHORS: Rabitz, Herschel

CONTRACT NO. F49820-87-C-0045

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XC  
TR-82-0855, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers research carried out over the period of the grant. Two areas of activities were pursued: (1) Gas-surface dynamics, and (2) optimal control of molecular motion. In the first category, research was carried out to develop hybrid discrete-continuum techniques to study energy transfer and reactivity of surfaces, including bulk dynamics and surface defects. The second aspect of the research into quantum control theory laid the foundation for the rigorous introduction of theoretical tools capable of designing external optical fields for manipulating molecular scale events. A general formulation of the theory was developed, for treating rotational, vibrational, and electronic degrees of freedom. Both aspects of the research involve the development of formal theoretical techniques, as well as their numerical implementation on a variety of applications. Gas-Surface dynamics, molecular control theory, laser-matter interaction

DESCRIPTORS: (U) \*DYNAMICS, \*ENERGY TRANSFER, \*REACTIVITIES, \*SURFACES, \*SOLIDS, \*ADSORBATES, CONTROL, CONTROL THEORY, DEGREES OF FREEDOM, ELECTRONICS, ENERGY, EXTERNAL, FORMULATIONS, GRANTS, INTERACTIONS, LASERS, MOTION, SCALE, THEORY, TOOLS, TRANSFER, GAS SURFACE INTERACTIONS, SCATTERING, PARTICLES.

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IDENTIFIERS: (U) PE61102F, WJAFDSR2303B3, \*Disordered,  
Molecular control theory, External optical fields, Bulk  
dynamics, Defects, Quantum Mechanics.

COLUMBIA UNIV NEW YORK MICROELECTRONICS SCIENCE LAB  
(U) Advanced Laser Chemical Processing For  
Microelectronics and Integrated Optics.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-15 Jun 92,

AUG 92 23P

PERSONAL AUTHORS: Osgood, Richard M., Jr.; Scarmozzino,  
Robert

CONTRACT NO. F49620-89-C-0088

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR, XT  
TR-92-0866, DARPA

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes a three-year research effort to explore advanced laser-chemical processing for microelectronics and integrated optics. The main goals of the work have been: (a) to develop techniques for fabrication of integrated optical devices in GaAs multilayer and quantum well structures, and (b) to explore new and novel techniques of advanced semiconductor processing for microelectronics and optoelectronics.

DESCRIPTORS: (U) \*INDIUM PHOSPHIDES, \*ELECTROOPTICS, CHEMICALS, ETCHING, FABRICATION, LASERS, MICROELECTRONICS, MODIFICATION, OPTICS, PROCESSING, SEMICONDUCTORS, STRUCTURES, SURFACES, WORK, CADMIUM, ANISOTROPY, GALLIUM ARSENIDES.

IDENTIFIERS: (U) \*Integrated optics, Anisotropic etching, MESFET, InP via etching, ECR Surface modification, WJAFDSR2301AS, PE61102F, Quantum wells.

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20/9

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Final Report for Grant Number AFOSR-88-0132,  
California University.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 91,

AUG 92 12P

PERSONAL AUTHORS: Metlu, H.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XC  
TR-92-0863, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have achieved two objectives: (1) We developed the theory of electron scattering by adsorbed molecule and used it to demonstrate that electron scattering is a good probe of the orientation of a chemisorbed molecule. (2) We developed the theory of photodissociation with ultrashort pulses, analyzed existing experiments and showed that coherence and interference play a central role in the dissociation process. By using numerical simulations we proposed and documented new types of experiments which can increase the amount of information regarding dynamics of dissociation.

DESCRIPTORS: (U) \*DISSOCIATION, \*DYNAMICS, \*ELECTRON SCATTERING, \*PHOTODISSOCIATION, \*MOLECULAR STRUCTURE, \*ADSORPTION, \*METALS, \*SURFACES, \*HARTREE FOCK APPROXIMATION, CALIFORNIA, COHERENCE, \*ELECTRONS, INTERFERENCE, MOLECULES, NUMBERS, PROBLEMS, PULSES, RECREATION, SCATTERING, SIMULATION, THEORY, ELECTRONICS, EXCITATION, COMPUTER PROGRAMS, SYMMETRY, COMPUTATIONS, PHOTOCHEMICAL REACTIONS.

IDENTIFIERS: (U) WUAFOSR2303B3, PE81102F, Femtosecond pulses, Calculations.

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MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF  
ELECTRONICS

(U) Organization of Workshop on Emerging Technologies for  
In-Situ Processing.

DESCRIPTIVE NOTE: Final rept. 15 Mar-31 Aug 92,

AUG 92 78P

PERSONAL AUTHORS: Melngailis, John

CONTRACT NO. F48620-92-U-0233

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0862, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the workshop was to bring together government, industrial and university representatives to assess the progress and future direction of in situ processing of semiconductors. Since the first NATO Workshop in this topic area (Cargese, Corsica in 1987) there has been surprising progress toward the industrial applications, particularly as exemplified by cluster tools and laser/ion beam real-time fabrication machines. The consensus of the workshop was that the economic implications of in situ processing are accelerating strongly, particularly for smaller countries (or even larger ones) where the costs of traditional semiconductor factories are growing at unacceptable rates. This problem and the potential solutions were the central themes of the conference. The talks by Larrabee, Saraswat and Prabhakar pointed to the need for future factories that are smaller and use flexible intelligent manufacturing. In semiconductor device manufacturing, in particular, smaller lots, cluster tools (i.e. in-situ processing), and tight process control will result in better contamination control and lower cost. The other talks of the conference provided specified examples of advances in in-situ processing that will contribute to making this vision of

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Intelligent flexible manufacturing a reality.

MICHIGAN UNIV ANN ARBOR ULTRAFast SCIENCE LAB

DESCRIPTORS: (U) \*SEMICONDUCTOR DEVICES, \*SEMICONDUCTORS, \*LASER APPLICATIONS, \*INDUSTRIAL ENGINEERING, \*MANUFACTURING, \*THIN FILMS, ORGANIZATIONS, PROCESSING, WORKSHOPS, TOOLS, LASER BEAMS, ION BEAMS, COST EFFECTIVENESS, LITHOGRAPHY, FABRICATION, PLASMAS(PHYSICS), MACHINING, INTEGRATED CIRCUITS, CERAMIC MATERIALS, SYMPOSIA.

(U) Transport in Heterostructures and Device in Microwave and Millimeter Wave Regimes.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 91-31 Mar 92,

MAR 92 13P

PERSONAL AUTHORS: Mourou, Gerard; Norris, Theodore; Whitaker, John

IDENTIFIERS: (U) Industrial applications, Molecular beam epitaxy, WUAFOSR2301A3, PE61102F.

CONTRACT NO. AFOSR-90-0214

PROJECT NO. 3848

TASK NO. ES

MONITOR: AFOSR, XC  
TR-92-0888, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) All modern high-fields (several hundred kilovolt/cm). The relevant time constants involved in, the carrier transport are typically in the subpicosecond domain. Under the URI contract, with techniques based on ultrashort laser pulses, we have studied the dynamics of carriers in the 100-1000 GHz regime in bulk, low-temperature grown, and quantum-size semiconductors. In addition, because of the relevance of high-speed electronics, we have studied the carrier dynamics in high Tc superconductors in the same frequency regime. During the course of the URI a number of technological innovations have been demonstrated and have found their way to the commercial world. The URI is at the origin of two spin-off companies, Medox Research and PicoTronix, now selling products first demonstrated in our laboratory. Also a license is being granted to a laser company to develop a laser amplifier product demonstrated during the course of the URI last year. It is important to note that the URI has helped to originate a large grant from NSF that was awarded to our group to pursue and expand our activity in the ultrafast science and technology domain.

DESCRIPTORS: (U) \*SEMICONDUCTORS, \*SUPERCONDUCTORS, AMPLIFIERS, FREQUENCY, LABORATORIES, LASER AMPLIFIERS.

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AD-A255 975

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AD-A255 974 11/4 20/11

LOW TEMPERATURE, MICROWAVES, MILLIMETER WAVES,  
TEMPERATURE, GALLIUM ARSENIDES, TIME, TRANSPORT, VELOCITY,  
PULSED LASERS, ALUMINUM ALLOYS.

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS  
(U) Delamination Growth Behavior in Cross-Ply Laminated  
Composites Due to Transverse Concentrated Loading.

IDENTIFIERS: (U) WUAFOSR3848ES, PE61102F.  
\*Heterostructures.

DESCRIPTIVE NOTE: Annual progress rept. 1 Oct 90-31 Sep  
91.

SEP 91 28P

PERSONAL AUTHORS: Liu, Sheng; Chang, Fu-Kuo

CONTRACT NO. AFOSR-89-0554

MONITOR: AFOSR, XC  
TR-92-0891, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An analytical model was developed to study the delamination growth behavior of graphite/epoxy cross-ply laminated composites resulting from quasi-static transverse concentrated loads. The objective of the study was to fundamentally understand the interaction between the initial matrix cracking and the delamination initiation and growth in laminated composites due to transverse concentrated loads. During this period of the investigation, attention is given to the growth of the surface matrix crack-induced delamination in cross-ply composites and the interaction between the matrix cracking and the delamination initiation and propagation inside the laminates. Based on the study, it shows that delamination growth in laminated composites due to transverse loads is strongly affected by the initial matrix cracks. Delamination induced by a bending crack (surface) would grow into a slender shape with its major axis parallel to the direction of the surface cracks. Mode I fracture toughness dominates the initiation and growth of the delamination induced by the bending cracks. Also, bending crack-induced delamination is stable in laminated composites.

DESCRIPTORS: (U) \*DELAMINATION, \*LAMINATES, \*GRAPHITE EPOXY COMPOSITES, BEHAVIOR, BENDING, CRACKS, GRAPHITE, INTERACTIONS, MODELS, SHAPE, SURFACES, TOUGHNESS, TRANSVERSE, CRACK PROPAGATION, MATRIX MATERIALS, FIBER REINFORCED COMPOSITES, FINITE ELEMENT ANALYSIS.

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AD-A255 971 20/12 9/1

IDENTIFIERS: (U) Laminated Composites, Delamination  
Growth, Transverse Concentrated Loading

SANTA BARBARA FOCALPLANE GOLETA CA

(U) Organic/IR-Semiconductor Heterojunctions for Low-Cost,  
High Temperature IR Arrays.

DESCRIPTIVE NOTE: Final rept. 31 Dec 91-31 Jun 92.

AUG 92 42P

PERSONAL AUTHORS: Jones, Colin E.

REPORT NO. OR-SBIR-92-6

CONTRACT NO. F49620-92-C-0014

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0898, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program evaluated a new technology for producing infrared photo-diodes in HgCdTe and InSb using evaporated organic heterojunctions. High quantum-efficiency IR detectors were demonstrated with the organic process comparable to commercial IR detectors. The organic photodiodes at room temperature were better than commercial detectors. They had lower leakage currents and higher resistance-area products (RoAs). Detector arrays made with the organics can operate at higher temperatures than the current detectors. Initial dam at low temperatures were poorer than commercial detectors with lower RoAs and slightly higher 1/f noise. This comparison at low temperature may change with further optimization of the organic process. The organic diode process is very simple, low cost and non-damaging to the HgCdTe or InSb. It involves thermal evaporation of the organic onto the HgCdTe or InSb followed by evaporation of metal contacts through a shadow mask. Phase 1 demonstrated organic/HgCdTe IR detectors with quantum efficiencies similar to commercial devices operating at higher temperatures. The technology is ready for a Phase 2 to further optimize the processing for IR arrays and to increase yields. IR Detectors, Organic Devices, Organic Semiconductors IR, Infrared, HgCdTe.

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AD-A255 971 CONTINUED

AD-A255 989 9/3 20/5 20/14

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF PHYSICS

InSb.

DESCRIPTORS: (U) \*ARRAYS, \*HETEROJUNCTIONS, \*LOW COSTS, \*PHOTODIODES, \*SEMICONDUCTORS, \*HIGH TEMPERATURE, \*INFRARED DETECTORS, COMPARISON, COSTS, DAMS, DETECTORS, DIODES, EFFICIENCY, EVAPORATION, LOW TEMPERATURE, MASKS, METAL CONTACTS, METALS, NOISE, OPTIMIZATION, PHASE, PROCESSING, QUANTUM EFFICIENCY, RESISTANCE, ROOM TEMPERATURE, SHADOWS, TEMPERATURE, YIELD, MERCURY, CADMIUM, TELLURIUM, INDIUM, ANTIMONY, ORGANIC MATERIALS, NARROW GAP SEMICONDUCTORS, SOLID STATE PHYSICS.

IDENTIFIERS: (U) WJAFOSR3005A1, PE65502F, Lower leakage current, RoA Values.

(U) Advances in Laser Cooling.

DESCRIPTIVE NOTE: Annual technical rept. Aug 91-Jul 92,

SEP 92 22P

PERSONAL AUTHORS: Metcalf, Harold

REPORT NO. TR-1

CONTRACT NO. AFOSR-91-0305

PROJECT NO. 2301

TASK NO. DS

MONITOR: AFOSR, XC  
TR-92-0889, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have made important progress in experiments and theory of laser cooling of neutral atoms. In addition, our understanding of quantum effects in laser cooling is evolving very rapidly, and this has enormous influence on how we view the subject. This change has impacted on both experimental and theoretical work.

DESCRIPTORS: (U) \*ATOMS, \*COOLING, \*LASERS, \*NEUTRAL, ADDITION, HELIUM, LIGHT, THEORY, TRANSITIONS, WORK, RUBIDIUM, DOPPLER EFFECT, LOW VELOCITY, ATOMIC BEAMS, STANDING WAVES, OPTICAL PUMPING.

IDENTIFIERS: (U) Radiofrequency-Induced transitions, Diffuse light cooling, WJAFOSR2301DS, PE61102F, Radiofrequency induced transitions, Optical standing waves, Diffuse light, Atomic physics.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A255 988 CONTINUED

CALIFORNIA UNIV SANTA BARBARA INST FOR POLYMERS AND ORGANIC SOLIDS

COMMUNICATIONS, PROCESSING, QUALITY, SOLITONS, STRUCTURES, SYNTHESIS, VALUE, STRUCTURAL PROPERTIES, NONLINEAR OPTICS, SILVER.

(U) Oriented Electro/Optical Polymers through In-Situ Chemistry during Gel Processing: A Research Opportunity.

IDENTIFIERS: (U) WUAFOSR2303A3, PE81102F, In-Situ, Conjugated polymers, Polyacetylenes.

DESCRIPTIVE NOTE: Final rept. 15 Sep 88-31 Dec 91,

SEP 92 13P

PERSONAL AUTHORS: Heeger, Alan J.; Smith, Paul; Mudl, Fred

CONTRACT NO. F49620-88-C-0138

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0867, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of the research was to obtain high performance properties (electrical and/or optical) from conjugated polymers by improving the structural order through polymer processing. The success of the approach is quantified by the demonstration of third order optical susceptibility values in excess of  $10^{-10}$  to the minus 8th power, 10 to the minus 7th power) esu for high quality, oriented trans-polyacetylene at frequencies in the infrared (frequencies which are relevant to optical communications). Equally important, we have identified a structure/property relationship that can be used to direct synthesis of new conjugated polymers with comparably large NLO coefficients. In conjugated polymers with degenerate ground state, the dominant NLO mechanism results from the neutral soliton Ag intermediate state mechanism. In a parallel effort, high performance electrical and mechanical properties were demonstrated in fibers made from conducting polymers.

DESCRIPTORS: (U) \*CHEMISTRY, \*GELS, \*POLYMERS, \*ELECTRICAL PROPERTIES, \*OPTICAL PROPERTIES, APPROACH, COEFFICIENTS, DEMONSTRATIONS, FIBERS, FREQUENCY, GROUND STATE, MECHANICAL PROPERTIES, NEUTRAL, OPTICAL

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SEARCH CONTROL NO. T4L281

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UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF  
AEROSPACE ENGINEERING

OREGON STATE UNIV CORVALLIS DEPT OF MATHEMATICS

(U) Control of Asymmetric Jet.

(U) Convergence and Divergence in Neural Networks:  
Processing of Chaos and Biological Analogy.

DESCRIPTIVE NOTE: Final technical rept. 1 May 90-30 Apr  
92.

92 23P

JUN 92 127P

PERSONAL AUTHORS: Moltos, George J.; Burton, Robert M.

PERSONAL AUTHORS: Ho, Chih-Ming

CONTRACT NO. F49620-92-J-0140

CONTRACT NO. AFOSR-90-0301

PROJECT NO. 2312

PROJECT NO. 2307

TASK NO. A1

TASK NO. B5

MONITOR: AFOSR, XC  
TR-92-0882, AFOSR

MONITOR: AFOSR, XC  
TR-92-0884, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Neural Networks, V5 p605-625 1992.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A passive method of enhancing the rate of entrainment by as much as 500% in subsonic open nozzle flows has been obtained by modifying axisymmetric nozzle geometry to a 2:1 aspect-ratio elliptic nozzle. Small aspect-ratio elliptical nozzles have been demonstrated to more efficiently control mixing processes and to exhibit increased rates of spreading, entrainment and fine-scale mixing than axisymmetric nozzles at subsonic and supersonic conditions in a confined dump combustor and in high-temperature ramjets. Vortex self-induction is the principle mechanism controlling mixing processes in asymmetric jet nozzles.

DESCRIPTORS: (U) \*COMBUSTORS, \*ENTRAINMENT, \*JET MIXING FLOW, \*TURBULENT FLOW, \*JET FLOW, ASPECT RATIO, AXISYMMETRIC, CONTROL, FINES, GEOMETRY, HIGH TEMPERATURE, MIXING, NOZZLES, NOZZLE GAS FLOW, SWITCHING, TEMPERATURE, HEAT TRANSFER, FLOW RATE, VELOCITY, VORTICES.

IDENTIFIERS: (U) Small aspect-ratio elliptic jet, Vortex self-induction bulk mixing, Small-scale mixing, Axis switching, WUAFOSR23078S, Elliptic jets.

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ABSTRACT: (U) We have used simple neural networks as models to examine two interrelated biological questions: what are the functional implications of the converging projections that profusely interconnect neurons? How do the dynamical features of the input signal affect the response of such networks? In this paper we examine subsets of these questions by using error-back propagation learning as the network response in questions. They dynamics by using input signals was suggested by our previous biological findings. These signals consisted of chaotic series generated by the recursive logistic equation  $X_{n+1} = 3.95(1 - X_n)X_n$ , random noise, and sine functions. The input signals were also sent to a variety of teacher functions that controlled the type of computations networks were required to do. Single and double hidden-layer networks were used to examine, respectively, divergence and a combination of divergence and convergence. Networks containing single and multiple input/output units were used to determine how the networks learned when they were required to perform single or multiple tasks on their input signals. Back propagation was performed on-line in each training trial, and all processing was analog. Chaos, Neural Networks, Attractors, Gradient Descent.

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AD-A255 873 CONTINUED

AD-A255 871 12/9 8/3

DESCRIPTORS: (U) \*CONVERGENCE, \*NEURAL NETS, \*BIOLOGY, ANALOGS, CHAOS, COMPUTATIONS, DESCENT, DYNAMICS, EQUATIONS, ERRORS, FUNCTIONS, GRADIENTS, INPUT, INSTRUCTORS, LAYERS, LEARNING, LOGISTICS, MODELS, NETWORKS, NOISE, OUTPUT, PAPER, PROCESSING, PROPAGATION, RESPONSE, SIGNALS, TRAINING.

OREGON STATE UNIV NEWPORT HATFIELD MARINE SCIENCE CENTER  
(U) Event-Dependent Control of Noise Enhances Learning in Neural Networks.

92 13P

PERSONAL AUTHORS: Burton, Robert M., Jr.; Mpltsos, George J.

CONTRACT NO. F49620-92-J-0140

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0881, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Neural Networks, v5 p827-837 1992.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We have devised noise-control algorithms, using biological adaptation as an analogy, application to response optimization in adaptive systems generally. The present paper illustrates one of these algorithms by showing its effects on increasing the rate of learning in neural networks. Optimization procedures usually employ simulated annealing by which noise is systematically decreased at a constant rate. Our methods are time-invariant, and control the level of injected noise solely through the response of the system. Such time-invariant noise algorithms (TINA) may be more applicable than annealing to adaptive systems that must respond to unpredictable environments, and may find analogy in brain-function. Both TINA and annealing have surprising properties of a new form of generalization in which networks that have been trained in the presence of noise are able to exhibit enhanced rates of learning in a subsequent learning task when no noise is present. We use special features of the geometry of error-surfaces, depicting the error as a function of changes in synaptic weights, to discuss the effect of noise in enhancing the rate of learning, and to compare learning strategies available to networks exposed to the different training procedures. Chaos, Random Noise, Simulated Annealing.

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Neural Networks.

GEORGIA TECH RESEARCH CORP ATLANTA

DESCRIPTORS: (U) \*ADAPTIVE SYSTEMS, \*NEURAL NETS, \*NOISE REDUCTION, ADAPTATION, ALGORITHMS, ANALOGIES, ANNEALING, BRAIN, CHAOS, CONSTANTS, CONTROL, ENVIRONMENTS, ERRORS, FUNCTIONS, GEOMETRY, LEARNING, NETWORKS, NOISE, OPTIMIZATION, PAPER, RATES, RESPONSE, STRATEGY, SURFACES, TIME, TRAINING, WEIGHT.

(U) Informal Conference on Photochemistry Held in Atlanta, Georgia on 28 April-1 May, 1992.

DESCRIPTIVE NOTE: Final rept. 1 Apr-31 Jul 92.

MAY 92 236P

IDENTIFIERS: (U) PE81102F, WJAFDSR2312A1.

PERSONAL AUTHORS: Wins, Paul H.

CONTRACT NO. F48620-92-J-0180

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC  
TR-92-0880, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The XXth Informal Conference on Photochemistry was held at the Colony Square Hotel in Atlanta, Georgia during the period April 28 - May 1, 1992. A total of 74 oral papers and 105 poster papers were presented. Most participants agreed that the scientific level of the conference was very high. One of the goals of this conference was to bring together leading researchers in a variety of basic and applied sub-areas of physical photochemistry. In this regard, discussion was stimulated which hopefully will lead to new interdisciplinary research initiatives. The support provided by AFOSR was used to (a) cover the \$50 registration fee for students/postdocs who attended the conference and presented papers and (b) cover lodging costs for some of the same students/postdocs.

DESCRIPTORS: (U) \*PHOTOCHEMICAL REACTIONS, COSTS, GEORGIA, STUDENTS, SPECTROSCOPY, FREE RADICALS, SURFACE ANALYSIS, ATMOSPHERICS, SYMPOSIA, PHOTODISSOCIATION, DIAGNOSTIC EQUIPMENT, OPTICAL EQUIPMENT, KINETICS, CONDENSATION, ENVIRONMENTS, CHEMICAL REACTIONS, ENERGY TRANSFER, CLUSTERING, METHANES, HYDROGEN, HALOGENS, CARBON, VIBRATION, LASERS, ORGANOMETALLIC COMPOUNDS, METALS, IONS, ADSORPTION, DESORPTION, OXIDATION, SEMICONDUCTORS, MOLECULES.

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IDENTIFIERS: (U) PE61102F, WJAFDSR2303ES, Photophysics,  
Femtochemistry, Methyl iodide, Van der Waals molecules,  
Nitric oxide.

AMERICAN CHEMICAL SOCIETY WASHINGTON DC

(U) Symposium on Polymeric Materials for Photonic and  
Optical Applications Held in New York, NY on August 25-  
30, 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jun-31 Aug 91,

SEP 92 118P

PERSONAL AUTHORS: Bjorklund, Gary C.

CONTRACT NO. AFOSR-81-0275

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0884, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A symposium on Polymeric Materials for  
Photonic and Optical Applications was held as part of the  
4th Chemical Congress of North America and 202nd ACS  
National Meeting during August 25-30, 1991 in New York, N.  
Y. This symposium was sponsored by the ACS Division of  
Polymer Chemistry and the ACS Division of Polymeric  
Materials: Science and Technology with the cooperation of  
the Optical Society of America. The symposium organizers  
were G.C. Bjorklund, G. Hadzioannou, J. Torkelson, and M.  
A. Winnik. The goal of the symposium was to cover in  
depth the chemistry, characterization, and device  
application of polymers for photonics and optics. The  
major objective was to bring together leading experts  
from around the world to elucidate the major scientific  
challenges and hurdles that must be overcome for photonic  
polymers to reach their full potential and find major  
device applications. The symposium consisted of a  
tutorial session, a poster session, and five oral  
sessions, extending over three full days. A total of 32  
distinguished scientists presented invited papers. Of  
these, 21 were from North America, 9 from Europe, and 2  
from Japan. In addition, 28 contributed papers were  
presented. Interactions among the attendees were quite  
good and the overall attendance was strong, with some of  
the sessions being held by more than 250 people.

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AD-A255 820 CONTINUED

AD-A255 810 8/3

COLORADO STATE UNIV FORT COLLINS DEPT OF FISHERY AND  
WILDLIFE BIOLOGY

DESCRIPTORS: (U) \*PHOTONICS, \*POLYMERS, \*OPTICAL  
MATERIALS, \*POLYMERIC FILMS, CHEMICALS, CHEMISTRY, DEPTH,  
INTERACTIONS, MATERIALS, OPTICS, SCIENTISTS, OPTICAL  
PROPERTIES, NONLINEAR OPTICS, ELECTROOPTICS, THIN FILMS,  
SYMPOsia.

(U) Bioaccumulation and Food Chain Transfer of Polycyclic  
Aromatic Hydrocarbons and Heavy Metals: A Laboratory  
and Field Investigation.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DESCRIPTIVE NOTE: Final rept. 15 Oct 91-14 Oct 92.

OCT 92 67P

PERSONAL AUTHORS: Clements, William H.

CONTRACT NO. AFOSR-89-0181

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC  
TR-92-0889, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The extent to which heavy metals and  
Polycyclic aromatic hydrocarbons (PAH) may be transferred  
up the food chain from sediments to benthic invertebrates  
and then on to fish species was examined using both  
laboratory and field techniques. PAHs were shown to  
bioaccumulate in a chironomid invertebrate (chironomus  
riparius) to relatively high levels depending on the  
specific compound. Accumulation in a fish species (Lepomis  
macrochirus) that was fed contaminated chironomids was  
found to be generally low. Mobilization of PAHs from  
sediments into water was affected by benthic organisms  
enhancing the bioavailability of these contaminants to  
other organisms. In field studies, certain benthic  
invertebrates and abiotic sediment components were also  
shown to accumulate heavy metals. This metal accumulation  
persisted even when metal concentrations in the water  
were diminishing.

DESCRIPTORS: (U) \*AROMATIC HYDROCARBONS, \*INVERTEBRATES,  
\*BIOCHEMISTRY, ACCUMULATION, CHAINS, CONTAMINANTS, FISHES,  
FOOD, FOOD CHAINS, HEAVY METALS, HYDROCARBONS,  
LABORATORIES, METALS, MOBILIZATION, SEDIMENTS, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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ECOLE NORMALE SUPERIEURE PARIS (FRANCE) GROUPE DE BIOINFORMATIQUE

DARTMOUTH MEDICAL SCHOOL HANOVER NH DEPT OF PSYCHIATRY

(U) From Animals to Animals: Proceedings of the International Conference on Simulation of Adaptive Behavior (1st) Held in Paris, France on 24-28 September, 1990.

(U) Multimodal Interactions in Sensory-Motor Processing.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Jun 92.

JUN 92 114P

DESCRIPTIVE NOTE: Final rept. 1 Sep 90-31 Aug 91.

PERSONAL AUTHORS: Gazzaniga, Michael S.

AUG 91 84P

CONTRACT NO. AFOSR-89-0437

PERSONAL AUTHORS: Meyer, Jean-Arcady; Wilson, Stewart W.

PROJECT NO. 2313

CONTRACT NO. AFOSR-90-0313

TASK NO. A4

PROJECT NO. 2313

MONITOR: AFOSR, XC  
TR-92-0883, AFOSR

TASK NO. A9

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC  
TR-92-0876, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) Sixty contributions from researchers in ethology, ecology cybernetics, artificial intelligence, robotics and related fields delve into the behaviors and underlying mechanisms that allow animals and, potentially, robots to adapt and survive in uncertain environments. They focus in various organizational principles on architectures capable of inducing adaptive behavior in real or artificial animals. This report includes the program and abstracts from the conference and the table of contents from the resulting book. Ethology, Robotics, Animal behavior, Simulation methods, Animals.

DESCRIPTORS: (U) \*ARTIFICIAL INTELLIGENCE, \*ROBOTICS, ABSTRACTS, ANIMALS, ARCHITECTURE, BEHAVIOR, BOOKS, CYBERNETICS, ECOLOGY, INTELLIGENCE, MODELS, ROBOTS, SIMULATION.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2313A9.

ABSTRACT: (U) Intersensory (Visual/auditory) facilitation of reaction times (RTs) was examined using three different response systems: saccadic eye movements, directed manual responses (deflections of a joystick towards the target location) and simple manual responses. The data were examined in the context of race models (in which facilitation is attributed to the minimum of two random variables representing the detection times associated with the visual and auditory targets) versus neural summation coactivation models (where the facilitation is attributed to a combination of the activities within the visual and auditory channels prior to detection). The first experiment provides evidence for neural summation coactivation in all three response modalities. The effects of varying combinations of auditory and visual stimulus intensity were examined in the second experiment. Intensity-dependent mismatches in the auditory and visual RTs had little effect on the magnitude of the redundant targets effect, indicating that visual-auditory integration occurs over temporal intervals of at least 40 msecs. The effects of spatial correspondence (auditory and visual targets presented in spatial register or in opposite hemifields) was examined in the third experiment. Coactivation depends upon the spatial alignment of the targets for directed responses (both saccades and directed

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AD-A255 748 5/8

DESCRIPTORS: (U) \*EYE MOVEMENTS, \*REACTION TIME, \*VISUAL TARGETS, ALIGNMENT, CHANNELS, DEFLECTION, DETECTION, EYE, INTEGRATION, INTENSITY, INTERACTIONS, INTERVALS, MODELS, MOTORS, PROCESSING, RANDOM VARIABLES, RESPONSE, TARGETS, VARIABLES.

OHIO STATE UNIV COLUMBUS

(U) Demodulation Processes in Auditory Perception.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 92.

IDENTIFIERS: (U) PE61102F, WJAFOSR2313A4.

AUG 92 191P

PERSONAL AUTHORS: Feth, Lawrence L.

CONTRACT NO. AFOSR-89-0227

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XC  
TR-92-0837, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This document reports the accomplishments of a project on the application of the Envelope-Weighted Average of Instantaneous Frequency (EWAIF) model to the processing of complex, time-varying sounds. We consider the task of human listeners to be one of recovering information imposed on the sound stream by a variety of sources. These include speech, music and other environmentally-important signals. Information is encoded in amplitude (envelope) and angle (frequency or phase) modulations of the sound stream carrier. The human listener must demodulate the stream to recover the information. EWAIF first demonstrated that these modulations interact and could provide discrimination cues even for steady-state signals such as those used in profile analysis or co-modulation masking. This project revised the EWAIF model into the IWAIF version Intensity (envelope-squared) weighting leads to greater computational efficiency (via the FFT) and to an intuitively appealing representation. The IWAIF calculation leads to the center-of-gravity of the spectrum. Tracking frequency modulations imposed on a narrow bandwidth carrier, then may be thought of as tracking the spectral center of gravity. Work continues on the extension of the IWAIF model to handle processing of signals with multiple modulation sources and to refining the short-term tracking abilities of the model. Complex Sound Discrimination.

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AD-A255 709 5/8 15/8 14/2

ROCHESTER UNIV NY DEPT OF COMPUTER SCIENCE

DESCRIPTORS: (U) \*DISCRIMINATION, \*MODULATION, \*AUDITORY PERCEPTION, AMPLITUDE, ANGLES, BANDWIDTH, CENTER OF GRAVITY, EFFICIENCY, HUMANS, INTENSITY, MASKING, MODELS, MUSIC, PHASE, PROCESSING, PROFILES, REFINING, SIGNALS, SOUND, SPEECH, STEADY STATE, FREQUENCY MODULATION.

(U) A Probabilistic Approach to Anytime Algorithm for Intelligent Real-Time Problem Solving.

DESCRIPTIVE NOTE: Final rept. 1 Dec 90-31 May 92.

IDENTIFIERS: (U) Sound processing.

AUG 92 38P

PERSONAL AUTHORS: Tenenberg, Josh; Allen, James

CONTRACT NO. AFOSR-91-0108

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XC  
TR-92-0828, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work on real time intelligent problem solving has focussed on the tradeoff between deliberation and activity. Such a tradeoff is required, since an excess of deliberation will be defeated by the dynamical nature of the world and by errors in the predictive model, and a lack of deliberation will not provide the agent with sufficient flexibility to perform well in novel situations. Our framework for evaluating this tradeoff includes both an explicit and an implicit component. In the explicit work, we represent the uncertainties associated with inaccuracies in the model and the inability to completely monitor changes in the world by expanding our language to include probabilities, and making choices about when to act and when to deliberate further based upon these explicit uncertainty measures. In the implicit approach, we use reinforcement learning of a Markov Decision Process to place a strict bound on deliberation. The agent's knowledge is obtained through an active sensory system having limited bandwidth, overcoming the standard limitations of assuming complete knowledge, but requiring modifications to the standard learning algorithm. Learning time is decreased by the use of social learning mechanisms as well as task decomposition and dynamic policy merging.

DESCRIPTORS: (U) \*PROBLEM SOLVING, ALGORITHMS, APPROACH,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A255 898 8/1 8/13 7/3

BANDWIDTH, SELECTION, DECOMPOSITION, DYNAMICS, ERRORS, LANGUAGE, LEARNING, LIMITATIONS, MODELS, MODIFICATION, MONITORS, PLANNING, POLICIES, REAL TIME, STANDARDS, TIME, UNCERTAINTY, WORK, MILITARY PLANNING.

STANFORD UNIV CA DEPT OF CIVIL ENGINEERING

(U) Anaerobic Microbial Transformation of Aromatic Hydrocarbons and Mixtures of Aromatic Hydrocarbons and Halogenated Solvents.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A7, Reinforcement learning, Probabilistic planning, Deliberation, Activity.

DESCRIPTIVE NOTE: Final rept. 30 Sep 88-31 Mar 92.

AUG 92 169P

PERSONAL AUTHORS: Edwards, Elizabeth A.; Liang, Li-Nuo; Grbic-Galic, Dunja

CONTRACT NO. AFOSR-88-0351

MONITOR: AFOSR, XC  
TN-92-0875, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Anaerobic microbial transformation of monoaromatic hydrocarbons (MAH), chlorinated benzenes (CB), and mixtures of MAH and CB, as well as MAH and chlorinated aliphatic solvents (tetrachloroethylene -- PCE, and carbon tetrachloride -CT) was studied in laboratory microcosms derived from hydrocarbon-contaminated groundwater aquifers. Some MAH, such as toluene and o-xylene, were completely degraded to CO<sub>2</sub> and CH<sub>4</sub> by mixed methanogenic cultures from a creosote-contaminated aquifer. This degradation was inhibited by the addition of accessory electron acceptors (oxygen, nitrate, sulfate), indicating acclimation of the microbial community to methanogenic conditions. The addition of preferred substrates, such as acetate, propionate, methanol, fatty acids, glucose, casamino acids, pepton, yeast extract, or acetone also inhibited MAH degradation, indicating that the presence of natural organic substrates may preclude anaerobic biodegradation of MAH in situ. Cyclohexane, CT, and high concentrations of toluene and o-xylene had a toxic effect under sulfate-reducing conditions. Several MAH toluene, all three xylene isomers, and benzene were mineralized to CO<sub>2</sub> by microorganisms from a petroleum-contaminated sulfidogenic aquifer. Whereas toluene and xylenes were sequentially degraded in a mixture, benzene was degraded only if alone, or slowly transformed in a mixture with toluene. This explains previously reported recalcitrance of benzene under anaerobic conditions. Anaerobic

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A255 888 7/3 7/2

Transformation, Monoaromatic Hydrocarbons, Chlorobenzenes, Carbon Tetrachloride, Tetrachloroethylene, Mixtures, Methanogenic, Sulfate-Reducing.

DESCRIPTORS: (U) \*HYDROCARBONS, \*MICROORGANISMS, \*MIXTURES, \*SOLVENTS, \*TRANSFORMATIONS, \*ANAEROBIC PROCESSES, \*HALOGENATED HYDROCARBONS, ACETATES, ACETONES, ACIDS, ADDITION, AQUIFERS, BENZENE, BIODETERIORATION, CARBON, CARBON TETRACHLORIDE, COMMUNITIES, CREOSOTE, CRUDE OIL, CULTURE, CYCLOHEXANES, DEGRADATION, ELECTRON ACCEPTORS, ELECTRONS, FATTY ACIDS, GLUCOSE, ISOMERS, LABORATORIES, METHANOLS, NITRATES, OILS, OXYGEN, PEPTONES, PROPIONATES, SUBSTRATES, SULFATES, TOLUENES, XYLENES, YEASTS, CHLOROBENZENE.

IDENTIFIERS: (U) \*Microbial, \*Aromatic, Tetrachloroethylene, Methanogenic, Growth medium, Inocula, Enrichments, MAH(Monoaromatic Hydrocarbons).

CALIFORNIA UNIV IRVINE DEPT OF CHEMISTRY

(U) Mixed-Valence Nitride-Bridged Vanadium Compounds. Synthesis and Structure of V<sub>2</sub>(N)(C<sub>15</sub>(TMEDA)<sub>2</sub>).

92 3P

PERSONAL AUTHORS: Sorensen, Kate L.; Lerchen, Megan E.; Ziller, Joseph W.; Doherty, Nancy M.

CONTRACT NO. AFOSR-87-0382

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC  
TR-92-0838, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Chemistry, v31 p2878-2879, 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) V(NSiMe<sub>3</sub>)C<sub>13</sub> (1) reacts with VC<sub>13</sub>(THF)<sub>3</sub> plus 2 equiv of TMEDA to form a compound of formula V<sub>2</sub>(N)(C<sub>15</sub>(TMEDA)<sub>2</sub>) (2) with release of ClSiMe<sub>3</sub>. An X-ray diffraction study shows that this species has an asymmetric linear nitride-bridged structure in the solid state, with V-N triple and single bond distances of 1.588(4) Å and 2.082(4) Å, respectively, and a VNV angle of 172.0(3)°. The crystal structure plus variable temperature magnetic data for the solid indicate that 2 is best represented as a mixed-valence compound consisting of a neutral square pyramidal vanadium(V) nitride, V(N)(C<sub>12</sub>(TMEDA)) (3), coordinated to an octahedral vanadium(III) center, (TMEDA)C<sub>12</sub>V triple bond N; yields VC<sub>13</sub>(TMEDA). Consistent with this, 3 can be prepared independently in good yield from 1 plus 1 equiv of TMEDA and reacts readily with VC<sub>13</sub>(THF)<sub>3</sub> plus TMEDA to produce 2. In the absence of TMEDA, 1 and VC<sub>13</sub>(THF)<sub>3</sub> react in a 2:1 ratio to form a related trivanadium dinitride or formula V<sub>3</sub>(N)2CL<sub>7</sub>(THF)<sub>2</sub>.xTHF (x = 0.33-0.50). This chemistry is used to illustrate the propensity of vanadium compounds to undergo reactions which allow formation of a strong short triple bond between the nitride ion and vanadium(V).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74L281

AD-A255 688 CONTINUED

AD-A255 684 11/6.1 20/11 7/2

DESCRIPTORS: (U) \*NITRIDES, \*STRUCTURES, \*SYNTHESIS, \*VALENCE, \*VANADIUM COMPOUNDS, ANGLES, AVAILABILITY, BONDING, CHEMISTRY, CRYSTAL STRUCTURE, CRYSTALS, DIFFRACTION, INORGANIC CHEMISTRY, IONS, METAL COMPLEXES, METALS, NEUTRAL, RATIOS, REACTIVITIES, RELEASE, REPRINTS, SOLIDS, TEMPERATURE, TRANSITION METALS, TRANSITIONS, VANADIUM, VARIABLES, X RAY DIFFRACTION, X RAYS, YIELD, CHLORIDES, SILICON.

SRI INTERNATIONAL MENLO PARK CA

(U) Modeling of Microstructural Effects on Fracture Processes at High Loading Rates.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 May 92,

JUN 92 210P

IDENTIFIERS: (U) \*Bridging nitride, silylimido compounds, Mixed-valence compounds, PE61102F, WUAFOSR230382, TMEDA(Tetra Methyl Ethylenediamine), Nitrido compounds.

PERSONAL AUTHORS: Giovanola, Jacques H.; Klopp, Richard W.; Shockey, D. A.

CONTRACT NO. F49620-89-K-0003

MONITOR: AFOSR, XC  
TR-92-0879, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We extended classical dynamic fracture mechanics to a class of new commercially useful titanium microstructures and demonstrated that their dynamic fracture behavior differs significantly from that of previously studied metal materials. By combining continuum measurements (obtained using the torsion split Hopkinson bar and one-point-bend fracture test methods) and fractographic measurements (obtained using fracture surface topography analysis, FRASTA), we generated a complete data base on static and dynamic strength and fracture toughness for various microstructures of the alloy Ti-10V-2Fe-3Al. We determined effects of microstructural features on microfailure behavior and we modeled some of the observed microfailure processes using finite element analysis. Whereas the dynamic initiation toughness was only moderately higher than the static initiation toughness (at most 20%), a very strong rise was found in the crack propagation toughness with crack extension (as much as a 100% increase) for velocities as low as 100 m/s. This rate dependent resistance curve effect is an intrinsic material property (in contrast to a structural effect) and a strong function of microstructure. We demonstrated that the formation of shear lips is also a strongly rate dependent phenomenon and that shear lips, when they develop, make only a modest contribution to the propagation toughness (on the order of 20% for the case studied here). Our results also showed that, in general, there is not a direct correlation between the dynamic initiation and

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AD-A255 684

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AD-A255 681 20/4

\* propagation toughnesses, T1-10V-2Fe-3Al, Microdamage, FRASTA, Dynamic fracture, Microstructure models, Dynamic resistance curve.

CALIFORNIA UNIV DAVIS

(U) Particle Dispersion in a Turbulent Shear Flow.

DESCRIPTORS: (U) \*ALLOYS, \*FRACTURE(MECHANICS), \*MICROSTRUCTURE, \*MODELS, \*TITANIUM, BEHAVIOR, CONTRAST, CORRELATION, CRACK PROPAGATION, CRACKS, DATA BASES, DYNAMICS, FINITE ELEMENT ANALYSIS, FUNCTIONS, MATERIALS, MEASUREMENT, MECHANICS, PROPAGATION, RATES, RESISTANCE, RODS, STATICS, SURFACES, TEST METHODS, TEST AND EVALUATION, TOPOGRAPHY, TORSION, TOUGHNESS, VELOCITY, STRENGTH(MECHANICS), CURVES(GEOMETRY), SHEAR PROPERTIES, PARAMETERS, GRAIN SIZE, AIRFRAMES.

DESCRIPTIVE NOTE: Final rept. 15 May 89-15 May 92,

JUL 92 44P

PERSONAL AUTHORS: Kennedy, Ian M.; Kollmann, Wolfgang

CONTRACT NO. AFOSR-89-0392

PROJECT NO. 2308

IDENTIFIERS: (U) LPN-SRI-7284, \*High loading rates, Microdamage, FRASTA(Fracture Surface Topography Analysis), Multiphase alloys.

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-0873, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A joint experimental and computational study of droplet dispersion in a round turbulent jet were carried out. Truly Lagrangian measurements of droplet dispersion were obtained with a laser scattering method. A low noise, high frequency response photomultiplier tube was used to track the location of particles as they traversed a sheet of laser light. Measurements of a single droplet at many closely spaced axial locations were obtained and were analyzed in terms of droplet times of flight to give Lagrangian statistics. The computational phase of the project consisted of stochastic simulations of droplet dynamics using the velocity statistics provided by a second order closure model for the jet flow, vortex dynamics for the initial region of the jet at infinite Reynolds number and finally a large eddy simulation method for the jet flow at finite Reynolds numbers. The droplet trajectories were computed to second order accuracy in each case. The large eddy simulation of a jet at a Reynolds number of 15,000 using the discretization error as filters showed very good results up to forty diameters downstream.

DESCRIPTORS: (U) \*TURBULENT FLOW, \*DROPS, \*PIPE FLOW, \*JET FLOW, PARTICLE TRAJECTORIES, VORTICES, REYNOLDS NUMBER, LASER TRACKING, PATHS, PHOTOMULTIPLIER TUBES, HELIUM NEON LASERS, VELOCITY, LIGHT SCATTERING, PARTICLE SIZE, EDDIES(FUID MECHANICS).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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AD-A255 675 11/8 7/4 20/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

IDENTIFIERS: (U) WJAFOSR2308BS, PEB1102F.

(U) Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-30 Jun 92,

SEP 92 13P

PERSONAL AUTHORS: Jonas, J.

CONTRACT NO. AFOSR-89-0089

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC  
TR-92-0872, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An improved molecular level understanding of the fundamental relationship between molecular properties and macroscopic properties of highly viscous liquids and sol-gel prepared glasses represented the main goal of research supported by this grant. In addition, the behavior of fluids in confined geometries was investigated. Further development of unique NMR and laser Raman scattering instrumentation for experiments under extreme conditions of high pressure continued to represent an important part of our research. In the project dealing with liquids confined to porous glasses, we succeeded, for the first time, to investigate the effect of pressure on the dynamics of liquids confined to porous glasses, and also to record a high-resolution NMR spectrum of a model lubricant in confined geometries. These unique experiments not only open new directions in the research on liquids in confined geometries but have important implications for the applied field of lubrication. Sol-Gel Process, Porous Glasses, NMR, High Pressure, Fluids in Confined Geometries, Lubricants.

DESCRIPTORS: (U) \*FLUIDS, \*GELS, \*HIGH PRESSURE, \*PRESSURE, \*GLASS, \*TEMPERATURE, \*POROUS MATERIALS, \*ADDITION, \*BEHAVIOR, \*DYNAMICS, \*GRANTS, \*HIGH RESOLUTION, \*INSTRUMENTATION, \*LASERS, \*LIQUIDS, \*LUBRICANTS, \*LUBRICATION, \*MODELS, \*MOLECULAR PROPERTIES, \*RECORDS, \*RESOLUTION,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A255 875 CONTINUED

AD-A255 674 11/8.1 7/2

SCATTERING, TIME, NUCLEAR MAGNETIC RESONANCE, SILICA GLASS.

HOWMET TURBINE COMPONENTS CORP WHITEHALL MI

(U) World Conference on Titanium (7th) Held in San Diego, California on June 28 Through July 2, 1992.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F, Sol gel process, Confined geometries, Macroscopic properties, Viscous liquids, Raman.

DESCRIPTIVE NOTE: Final rept.,

JUL 92 5P

PERSONAL AUTHORS: Paton, Neil; Froes, F. H.

CONTRACT NO. AFOSR-91-0090

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0871, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with University of Idaho.

ABSTRACT: (U) This report covers the 7th World Conference on Titanium held in San Diego California, June 28 to July 2 1992. The purpose of the conference was to exchange information on advances in technology in titanium alloys, titanium processing, and applications of titanium alloys. Over 300 oral and 180 poster presentations were made by attendees from over 40 different countries including the former Soviet Union, Japan, China, and Europe. Total attendance was over 700, which exceeded conference expectations.

DESCRIPTORS: (U) \*TITANIUM ALLOYS, ALLOYS, CALIFORNIA, CHINA, EUROPE, EXCHANGE, JAPAN, PROCESSING, TITANIUM, USSR, SYMPOSIA, METALS, COMPOSITE MATERIALS, METALLURGY.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F, Materials technology.

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AD-A255 686 20/8 7/4 14/2 9/3  
13/8LOUGHBOROUGH UNIV OF TECHNOLOGY (UNITED KINGDOM) DEPT OF  
PHYSICS(U) Application of Gel-Silica Optics to Laser Technology  
and Optical Element Fabrication.

DESCRIPTIVE NOTE: Final rept. 1 Aug 91-31 Jul 92.

SEP 92 19P

PERSONAL AUTHORS: Phillips, Nicholas J.

CONTRACT NO. AFOSR-91-0300

PROJECT NO. 1601

TASK NO. 06

MONITOR: AFOSR, XC  
TR-92-0870, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) Three main areas of activity are summarized in this report: (a) The creation of novel optical materials i.e. composites of gel-silica with materials such as pm.m.ma. (acrylic) so as to achieve invariance of the refractive index or optical path during thermal expansion -- a new class of optical materials for worldwide use. (b) The impregnation of porous gel-silica with anthracene, for example, to create a solid composite material capable of emitting blue light by electro-luminescence. This area of activity is aimed at the fabrication of solid state devices that can fill the gap, not currently filled by semiconducting devices. Porous gel-silica anthracene complexes may provide at least an intermediate class of devices capable of providing reasonably pure blue light emission under electrical excitation. (c) The impregnation of porous gel-silica with imaging monomer to create thick volume optical elements for optical systems. The methodology is reasonably straightforward and leads to the formation of lenses or gratings in the volume of thick silica layers. Such materials are optically useful for beam steering, head up displays and other applications.

DESCRIPTORS: (U) \*ANTHRACENES, \*HEAD UP DISPLAYS,

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\*OPTICAL MATERIALS, \*LASER BEAMS, ANATOMY, BEAM STEERING, BLUE(COLOR), COLORS, COMPOSITE MATERIALS, EMISSION, EXCITATION, EXPANSION, FABRICATION, GELS, HEAD(ANATOMY), IMPREGNATION, INDEXES, INVARIANCE, LAYERS, LENSES, LIGHT, LUMINESCENCE, MATERIALS, METHODOLOGY, MONOMERS, PATHS, REFRACTIVE INDEX, SOLIDS, STEERING, THERMAL EXPANSION, VOLUME.

IDENTIFIERS: (U) WUAFOSR160106, PE83218C.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

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7/2 7/3 7/4

CALIFORNIA UNIV IRVINE DEPT OF CHEMISTRY

(U) Reactions at Metal-Bound Nitrogen Atoms. Formation of Molybdenum and Tungsten Phosphoraniminato Complexes from Silylimido Complexes and Synthesis of a Nitride-Bridged Tungsten Derivative.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382,  
\*Phosphoraniminato complexes, \*Silylimido complexes,  
Imido.

92 9P

PERSONAL AUTHORS: Lichtenhan, Joseph D.; Ziller, Joseph W.  
; Doherty, Nancy M.

CONTRACT NO. AFOSR-87-0362

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC  
TR-92-0839, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Chemistry, v31 p2893-2900 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The chemistry of transition-metal complexes with organo-nitrogen ligands-amines, amidos, imidos, and hydrazidos-has been investigated by a number of chemists due to the relevance of these ligands to metal-promoted industrial and biological processes. In comparison, however, transition-metal complexes containing main-group-substituted nitrogen ligands-such as silylimidos and phosphoraniminatos have received much less attention. We have prepared a number of transition-metal silylimido derivatives and examined their reactions with transition-metal halides; formation of nitride-bridged products occurs readily and in extremely high yield for some silylimido complexes, but not at all for others.

DESCRIPTORS: (U) \*NITROGEN, \*ATOMS, \*CHEMICAL REACTIONS, \*MOLYBDENUM, \*TUNGSTEN, \*TRANSITION METAL COMPOUNDS, REPRINTS, METALS, PHOSPHORUS COMPOUNDS, SYNTHESIS, LIGANDS, NITRIDES, BRIDGES, HALOGENS, CONDENSATION REACTIONS, CRYSTAL STRUCTURE, CHEMICAL BONDS.

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CALIFORNIA UNIV BERKELEY DEPT OF CHEMISTRY

(U) Electronically Excited Molecules: Reaction Kinetics and Emission of Light: Nanosecond Infrared Spectroscopy, Electronic Emission from Chemical Reactions.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-15 Apr 91,

FEB 92 7P

PERSONAL AUTHORS: Moore, C. B.

CONTRACT NO. AFOSR-88-0054

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC  
TR-92-0829, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A time-resolved ir absorption spectrometer capable of detecting chemical transients on the nanosecond timescale was designed, constructed, and successfully implemented. The spectrometer was used to characterize the vibrational relaxation of an open shell radical species, CF<sub>3</sub>, produced with excess energy from the photolysis of the parent CF<sub>3</sub>I compound. The effects of vibrational excitation in the CF<sub>3</sub> radical on the reaction CF<sub>3</sub> + Br<sub>2</sub> CF<sub>3</sub>Br + Br were measured. Broadband data collection techniques were used to monitor the reactive and relaxation pathways simultaneously. The energetic radicals react no faster than the thermalized CF<sub>3</sub> and may actually have a lower cross section for reaction. The spectrometer was also used to detect the gas phase absorption spectra of the polyatomic radicals. A thorough investigation into ozone-olefin reactions in a cryogenic matrix environment was completed. It was possible to complex ozone with various olefinic partners through careful control of the matrix deposition process, despite the very low (1-5 kcal/mole) activation energies for the ozonolysis reactions. The ground state complexes were observed to form a charge-transfer (CT) complex upon excitation.

DESCRIPTORS: (U) \*EXCITATION, \*ELECTRONICS, \*MOLECULES, \*CHEMICAL REACTIONS, \*KINETICS, \*EMISSION, \*LIGHT, ABSORPTION, ABSORPTION SPECTRA, ACTIVATION, ACTIVATION ENERGY, BROADBAND, CHARGE TRANSFER, CHEMICALS, COLLECTION, CONTROL, CROSS SECTIONS, CRYOGENICS, DEPOSITION, ENERGY, ENVIRONMENTS, GROUND STATE, OZONE, PHASE, PHOTOLYSIS, RELAXATION, SPECTRA, SPECTROMETERS, TIME, TRANSFER, TRANSIENTS, INFRARED SPECTROSCOPY, VIBRATION, CARBON, FLUORIDES, IODIDES, BROMIDES, OLEFIN POLYMERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230381, Nanoseconds, Open shell radical species, Matrix environment.

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A255 618 CONTINUED

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SOUTHERN METHODIST UNIV DALLAS TX DEPT OF GEOLOGICAL SCIENCES

(U) High Resolution Geological Site Characterization Utilizing Ground Motion Data.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 90-31 Oct 91.

JUN 92 96P

PERSONAL AUTHORS: Stump, Brian W.; Hayward, C.; Pearson, C.; Bogaards, M.; Craven, M.

REPORT NO. SMU-G-10

CONTRACT NO. AFOSR-89-0178

PROJECT NO. 2309

TASK NO. A2

MONITOR: AFOSR, HC  
TR-92-0833, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work in the past reporting period has been focused in four areas all related to our task of shallow geological site characterization using seismic waves. The first area of emphasis is documented in, Comparison of Sources for Shallow Seismic Imaging: Radiation, Energy and Bandwidth by Hayward and Pearson. This paper contrasts a variety of shallow seismic sources for P and S waves. The second paper, Characterization of the Shallow Weathered Zone with Complete Seismograms is by Bogaards and Stump. This work documents the separation of stochastic and deterministic wave propagation effects in the shallow weathered zone. The status of a parallel investigation designed to use the surface wave arrivals in constraining near-surface Q's and velocities is discussed in the third contribution by Mike Craven. Finally, the comparison of site characterization information is made to waveform variability observed from high explosive testing in Experimental Studies of Stochastic Geologic Influences on Near-Source Ground Motions by Reinke and Stump. Seismology, P and S sources, stochastic and deterministic wave propagation, surface wave inversions.

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DESCRIPTORS: (U) \*HIGH EXPLOSIVES, \*SEISMIC WAVES, \*GEOLOGICAL SURVEYS, \*EXPLOSION EFFECTS, BANDWIDTH, COMPARISON, ENERGY, EXPLOSIVES, GROUND MOTION, INVERSION, RADIATION, SEISMOLOGY, SURFACE WAVES, VELOCITY, WAVE PROPAGATION, WAVEFORMS, PRIMARY WAVES(SEISMIC WAVES), SECONDARY WAVES, SEISMOGRAPHS, SEISMIC REFLECTION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2309A2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4L281

AD-A255 483 CONTINUED

AD-A255 483 6/4 5/8

NEW YORK UNIV NY

(U) Cognition and the Brain.

DESCRIPTIVE NOTE: Annual Technical rept. 15 Feb 91-14 Feb 92,

MAY 92 119P

PERSONAL AUTHORS: Williamson, S. J.; Kaufman, L.

CONTRACT NO. AFOSR-90-0221

MONITOR: AFOSR, XC  
TR-92-05446, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Magnetic fields associated with spontaneous neuronal activity of cerebral cortex are shown to be locally suppressed when an area of the brain engages in a cognitive function. Suppression occurs in visual cortex when the image of an object is compared with a memory set of objects previously seen, or with the same object rotated. Suppression occurs in auditory cortex when memory of a tone is compared with a memory set of tones. Suppression occurs first over a visual cortex and subsequently over the anterior temporal area when a subject responds to a displayed word by seeking a word that rhymes with it. Significant correlations are found between the timing of cortical suppression and classic behavioral studies of reaction times. It is concluded that regional changes in cortical spontaneous activity are meaningfully related to memory scanning, image transformations, and silent speech. A computational procedure, called the minimum-norm least-square (MMLS) estimate, has been developed to provide a unique solution for the magnetic inverse problem. With this algorithm, the distribution of intracellular current across the surface of cerebral cortex can be deduced from the magnetic field pattern that it produces across the scalp. This approach has been generalized to provide a unique estimate for the distribution of time-average current power, obtained from the average field power. It can also be applied to determine the pattern of current power suppression when the subject is engaged in a cognitive task.

DESCRIPTORS: (U) \*CEREBRAL CORTEX, \*COGNITION, \*MAGNETIC FIELDS, BRAIN, CORRELATION, DISTRIBUTION, ELECTROENCEPHALOGRAPHY, ESTIMATES, FUNCTIONS, IMAGES, PATTERNS, POWER, REACTION TIME, ROTATION, SCANNING, SPEECH, SUPPRESSION, SURFACES, TIME, TRANSFORMATIONS, VISUAL CORTEX, NEUROPHYSIOLOGY.

IDENTIFIERS: (U) Localization of cognitive processes, Alpha-band suppression, Memory scanning for tones, Silent speech, Visual image rotation, Magnetic source imaging (MSI), Magnetoencephalography (MEG), Electroencephalography (EEG), PE81102F, WU2313BS.

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ILLINOIS UNIV AT URBANA DEPT OF VETERINARY BIOSCIENCES MALES, HISTOCHEMISTRY, IMMUNOLOGY.

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Based Air Force Fuels. IDENTIFIERS: (U) Nephrotoxic, \*Alpha-2U Globulin, Immunohistochemistry.

DESCRIPTIVE NOTE: Annual Technical rept. 1 Jul 91-30 Jun 92,

AUG 92 6P

PERSONAL AUTHORS: Eurell, Thomas E.

CONTRACT NO. AFOSR-90-0303

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC  
TR-92-0836, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Adult male rats have a strain, dose, and time-dependent renal proximal tubular degeneration induced by certain hydrocarbon compounds. We are using rat strain variation (Fisher 344 and NCI Black Reiter) and different hydrocarbon compounds (JP-4, JP-8, decalin and trimethylpentane) to investigate the hydrocarbon-induced nephrotoxic response. Histochemical and morphometric evaluation of NCI-Black Reiter rats exposed to JP-8 indicate that this strain undergoes an intermediate form of the hydrocarbon-induced nephrotoxicity, when compared to the albino Fisher 344 strain. The intermediate nephrotoxic response of the NCI-Black Reiter rat is characterized by approximately a two-fold increase in the number of acid phosphatase reactive lysosomes in renal tubular cells. The NBR rats did not demonstrate an increase in the size of the individual lysosomes, however, a characteristic lysosomal aggregation pattern occurred in renal tubular cells following hydrocarbon exposure.

DESCRIPTORS: (U) \*ALPHA GLOBULIN, \*GLOBULINS, \*TOXICITY, ACID PHOSPHATASE, ACIDS, ADULTS, CELLS, HYDROCARBONS, MALES, NUMBERS, PATTERNS, PHOSPHATASES, RATS, RESPONSE, TIME, VARIATIONS, CRUDE OIL, STRAINS(BIOLOGY), FUELS.

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OHIO STATE UNIV COLUMBUS DEPT OF PHYSICS

YALE UNIV NEW HAVEN CT DEPT OF COMPUTER SCIENCE

(U) Dynamical Properties of Josephson Junctions Arrays.

(U) Recursively Generated Networks and Dynamical Learning.

DESCRIPTIVE NOTE: Final rept. 15 Sep 89-14 Sep 91,

DESCRIPTIVE NOTE: Final rept..

JUL 92

25P

DEC 91

50P

PERSONAL AUTHORS: Ebner, C. A.; Jayaprakash, C.

PERSONAL AUTHORS: Mjolsness, Eric

CONTRACT NO. AFOSR-89-0527

CONTRACT NO. AFOSR-88-0240

PROJECT NO. 2308

PROJECT NO. 2305

TASK NO. C1

TASK NO. B3

MONITOR: AFOSR, XC  
TR-92-0848, AFOSR

MONITOR: AFOSR, XC  
TR-92-0831, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) Current and recent work in our group on Josephson junction arrays has been focused on two particular types of dynamical states, namely chaotic states and 'chain' states. In the following we summarize briefly the issues addressed and the significant results obtained for each type of state.

DESCRIPTORS: (U) \*JOSEPHSON JUNCTIONS, CHAINS, JUNCTIONS, CHAOS, ELECTROMAGNETIC RADIATION, ARRAYS.

ABSTRACT: (U) Much of the research has been based on the premise is that mathematical methods and notation associated with constrained optimization should be used to specify a neural net, which can then be compiled to diverse implementations. But where do they get such a compiler? And what are the details of this mathematical notation? They have made substantial progress on these research questions: (1) They have developed mathematical methods that can transform one algebraic NN description into another, more implementable one. These developments were attained by serious work in the applied mathematics of neural nets. They can form the basis of a neural compiler because they address most of the major NN compilation and implementation issues. But they do not yet suffice. (2) They have been accumulating the research in a neural simulator. It can be expanded into a semi-automatic compiler: a neural net design and implementation environment based on mathematical methods. (3) They have developed a mathematical notation (not yet a formal language) for describing complex problem domains in terms of constrained optimization problems. The optimization problems can be solved by neural nets.

DESCRIPTORS: (U) \*COMPIERS, \*MATHEMATICAL MODELS, \*LEARNING, APPLIED MATHEMATICS, AUTOMATIC, ENVIRONMENTS, LANGUAGE, MATHEMATICS, NETS, NEURAL NETS, OPTIMIZATION, SIMULATORS, WORK.

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IDENTIFIERS: (U) PEG1102F, WUAFOSR230583.

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PSYCHIATRY  
(U) Extrathalamic Modulation of Cortical Function.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 91-30 Jun 92,

AUG 92 8P

PERSONAL AUTHORS: Foote, Stephen L.; Pineda, Jaime A.

CONTRACT NO. AFOSR-90-0325

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC  
TR-92-8841, AFOSR

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ABSTRACT: (U) The goal of the proposed studies is to characterize the effects of noradrenergic (NA) afferents on cortical information processing. Our previous studies indicate that the primate locus coeruleus (LC) system, originating in the pontine brainstem, innervates neocortex more densely than previously thought, exhibiting highly specific patterns in terms of the regional and laminar distribution of its axons. Our previous neurophysiological observations suggest that this system imposes state-related modulatory effects on thalamo-cortical and cortico-cortical systems. The proposed studies have the following Specific Aims: (1) To examine, in monkeys, the effects of manipulating the LC-NA system on ERPs, EEG characteristics, and associated behaviors in operant paradigms that utilize visual or auditory cues; (2) To correlate the activities of individual monkey LC-NA neurons with cortical neuronal activity and the measures utilized in Aim 1; (3) To extend our preliminary observation that activation of the LC by local drug infusion, in halothane-anesthetized rats, produces EEG signs of cortical and hippocampal activation; (4) To examine the relationship between the intensity of LC neuronal activity and rates of norepinephrine release in neocortex and hippocampus by performing microdialysis in these forebrain terminal regions in anesthetized rats during manipulation of LC activity.

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DESCRIPTORS: (U) \*HIPPOCAMPUS, \*NERVE CELLS, ACTIVATION, DISTRIBUTION, DRUGS, INFORMATION PROCESSING, INFUSIONS, INTENSITY, LOCUS, MONKEYS, NOREPINEPHRINE, OBSERVATION, PATTERNS, PRIMATES, PROCESSING, RATES, RATS, REGIONS, RELEASE, TERMINALS, ORGAN OF CORTI.

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Development of Neural Network Architectures for Self-Organizing Pattern Recognition and Robotics.

DESCRIPTIVE NOTE: Annual technical rept. no. 2, 15 Dec 90-14 Feb 92.

IDENTIFIERS: (U) PEB1102F, WUAFOSR231285.

JUL 92 14P

PERSONAL AUTHORS: Carpenter, Gail A.; Grossberg, Stephen

CONTRACT NO. AFOSR-90-0083

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC  
TR-92-0835, AFOSR

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ABSTRACT: (U) During the second year of the DARPA ANNT Program contract, new neural network architectures were developed to carry out autonomous real-time preprocessing, segmentation, recognition, timing, and control of both spatial and temporal inputs. These architectures contribute to: (1) preprocessing of visual form and motion signals; (2) preprocessing of acoustic signals; (3) adaptive pattern recognition and categorization in an unsupervised learning context; (4) adaptive pattern recognition and prediction in a supervised learning context; (5) processing of temporal patterns using working memory networks, with applications to 3-D object recognition; (6) adaptive timing for task scheduling; (7) adaptive sensory-motor control using head-centered spatial representations of 3-D target position.

DESCRIPTORS: (U) \*NEURAL NETS, \*PATTERN RECOGNITION, \*COMPUTER ARCHITECTURE, \*ROBOTICS, ACOUSTIC SIGNALS, ACOUSTICS, ARCHITECTURE, CONTROL, HEAD(ANATOMY), INPUT, LEARNING, MOTION, MOTORS, NETWORKS, PATTERNS, PREDICTIONS, PREPROCESSING, PROCESSING, REAL TIME, RECOGNITION, SCHEDULING, SIGNALS, TARGETS, TIME, SELF ORGANIZING SYSTEMS, SIGNAL PROCESSING, SEGMENTED.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2313CS.

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9/5 20/8

MINNESOTA UNIV MINNEAPOLIS DEPT OF PSYCHOLOGY

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Psychophysical Analyses of Perceptual Representations.

(U) Integrated Photonics Research Technical Digest Series. Volume 10. Conference Edition: Summaries of Papers Presented at the Integrated Photonics Research Topical Meeting Held in New Orleans, Louisiana on 13-18 April 1992.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 91-14 Apr 92.

AUG 92 12P

PERSONAL AUTHORS: Biederman, Irving; Legge, Gordon E.

DESCRIPTIVE NOTE: Quarterly rept..

CONTRACT NO. AFOSR-90-0274

APR 92 485P

PROJECT NO. 3484

PERSONAL AUTHORS: Quinn.

TASK NO. HS

CONTRACT NO. F49620-92-J-0264

MONITOR: AFOSR, XC  
TR-92-0834, AFOSR

PROJECT NO. 2301

UNCLASSIFIED REPORT

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0739, AFOSR

ABSTRACT: (U) Research during the year has been divided between studies at USC (Biederman and students) and Minnesota. Our research continues to focus on linking early sensory representations to higher-level perceptual representations. Studies outlined below have examined the sensory/perceptual middle ground in object recognition, depth perception, reading, and auditory perception. Several of our studies have used ideal-observer analysis. The ideal-observer approach provides a means for quantifying the information available to perception and for evaluating the effectiveness with which humans use that information.

DESCRIPTORS: (U) \*PSYCHOLOGY, APPROACH, AUDITORY PERCEPTION, DEPTH, HUMANS, MINNESOTA, OBSERVERS, PERCEPTION, READING, RECOGNITION, STUDENTS, SENSORY DEPRIVATION, HEARING.

IDENTIFIERS: (U) PE611030, WUAFOSR3484HS, Psychophysical perception, Object recognition, Auditory perception.

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-PO08 072 thru AD-PO08 228.

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ABSTRACT: (U) This symposium includes sessions on the following topics: (1) Quantum confinement and vertical cavity devices; (2) Acoustooptic and magneto-optic devices; (3) Spatial solitons and planar waveguides; (4) Optoelectronic integrated circuits; (5) Optical fiber solitons; (6) Dielectric waveguides and devices; (7) Electrooptic devices; (8) Novel materials and processing; (9) Beam propagation methods; (10) Special purpose glasses and fiber amplifiers; (11) Lasers; (12) Nonlinear fiber phenomena; (13) All-optical switching; and (14) Semiconductor waveguides and devices.

DESCRIPTORS: (U) \*PHOTONICS, \*OPTICAL PROPERTIES, \*ACOUSTOOPTICS, \*MAGNETOOPTICS, \*FIBER OPTICS, \*ELECTROOPTICS, ELECTROMAGNETIC WAVE PROPAGATION, OPTICAL WAVEGUIDES, HARMONICS, DIELECTRICS, SYMPOSIA, SEMICONDUCTOR DEVICES, HARMONICS, OPTICAL SWITCHING, SEMICONDUCTOR LASERS, OPTICAL CIRCUITS, FERROELECTRIC MATERIALS, OPTICAL MATERIALS, BIREFRINGENCE.

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OPTICAL SOCIETY OF AMERICA WASHINGTON DC

IDENTIFIERS: (U) WUAFOSR2301AS, PE61102F, Second harmonic generation..

(U) Physics of X-ray Multilayer Structures: Summaries of Papers Presented at the Physics of X-ray Multilayer Structures Topical Meeting Held in Jackson Hole, Wyoming on March 2-5, 1992. (1992 Technical Digest Series Volume 7).

MAR 92 213P

CONTRACT NO. F49620-92-J-0284

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0737, AFOSR

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SUPPLEMENTARY NOTE: For sales information of individual items, see AD-PO08 019 thru AD-PO08 071.

DESCRIPTORS: (U) \*CRYSTALLOGRAPHY, PHYSICS, X RAY DIAGNOSTICS, OPTICS, LASERS, SYMPOSIA, SPUTTERING, MIRRORS, MOLYBDENUM, SILICON.

IDENTIFIERS: (U) Soft x ray reflectance, PE61102F, WUAFOSR2301AS..

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ALABAMA A AND M UNIV NORMAL DEPT OF BIOLOGY

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Effects of Halogenated Hydrocarbons on Aquatic Organisms.

(U) Wavelet Methods for Curve Estimation.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Aug 91-1 Aug 92.

DESCRIPTIVE NOTE: Technical rept.,

AUG 92

37P

JUL 92

33P

PERSONAL AUTHORS: Tadros, Mahasin G.

PERSONAL AUTHORS: Antoniadis, A.; Gregoire, G.; McKeague, I. W.

CONTRACT NO. F49620-91-C-0063

REPORT NO. FSU-M-869, USARO-D-128

PROJECT NO. 3484

CONTRACT NO. DAAL03-80-G-0103

TASK NO. RS

MONITOR: ARO, AFOSR, XA

MONITOR: AFOSR, XC  
TR-92-0842, AFOSR

27888.18-MA, TR-91-271, ARO

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## UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes progress for the first year of the subcontract, AFOSR F49620-91-C-0063 entitled Effects of Halogenated Hydrocarbons on aquatic organisms. This research dealt with several experiments evaluating the response of different algal species towards selected halogenated hydrocarbons. Two groups of algal species were assayed. The response of the algal species towards the chemical was evaluated under various growth conditions. Species varied in their response towards the chemicals. The green species were more sensitive than the diatoms, in respect to temperature. Within each group there were tolerant and sensitive species. In conclusion, when bioassaying the halogenated hydrocarbons, various algal species as well as growth parameters should be considered. Algae- Halogenated hydrocarbons.

DESCRIPTORS: (U) \*ALGAE, \*AQUATIC ORGANISMS, \*HALOGENATED HYDROCARBONS, CHEMICALS, HYDROCARBONS, PARAMETERS, RESPONSE, TEMPERATURE.

IDENTIFIERS: (U) PE61103F, WUAFOSR3484RS.

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ABSTRACT: (U) The theory of wavelets is a developing branch of mathematics with a wide range of potential applications. Compactly supported wavelets are particularly interesting because of their natural ability to represent data with intrinsically local properties. They are useful for the detection of edges and singularities in image and sound analysis, and for data compression. However, most of the wavelet based procedures currently available do not explicitly account for the presence of noise in the data. A discussion of how this can be done in the setting of some simple nonparametric curve estimation problems is given. Wavelet analogues of some familiar kernel and orthogonal series estimators are introduced and their finite sample and asymptotic properties are studied. We discover that there is a fundamental instability in the asymptotic variance of wavelet estimators caused by the lack of translation invariance of the wavelet transform. This is related to the properties of certain lacunary sequences. The practical consequences of this instability are assessed. Multiresolution analysis, nonparametric regression, hazard rate, kernel smoothing, orthogonal series, delta sequences.

DESCRIPTORS: (U) \*APPLIED MATHEMATICS, \*NONPARAMETRIC STATISTICS, COMPRESSION, DATA COMPRESSION, DELTAS, DETECTION, EDGES, HAZARDS, IMAGES, INSTABILITY, INVARIANCE, MATHEMATICS, NOISE, RATES, SEQUENCES, SOUND,

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THEORY, TRANSLATIONS, STATISTICAL INFERENCE.

IDENTIFIERS: (U) \*Wavelets.

AD-A255 331 5/1 5/2

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research AFOSR  
Technical Report Summaries.

DESCRIPTIVE NOTE: Quarterly rept. Oct-Dec 91,

91 170P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XC  
TR-92-0845, AFOSR

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ABSTRACT: (U) The AFOSR Technical Report Summaries are published quarterly of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for that quarter.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH MANAGEMENT, TECHNICAL INFORMATION CENTERS, DEPARTMENT OF DEFENSE, ABSTRACTS, BIBLIOGRAPHIES, INDEXES.

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MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

(U) Physics and Technology of Resonant-Tunneling Devices.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 92.

JUL 92 250P

PERSONAL AUTHORS: Brown, E. R.

PROJECT NO. 2305

TASK NO. 85

MONITOR: AFOSR, XC  
PD-89-0005, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) Over the three-year course of this program, several issues in the device physics of resonant-tunneling diodes (RTDs) have been investigated, including the small-signal admittance, the shot noise, and the transport through multiple-quantum well structures. A large quantum-well inductance has been measured in the negative-differential-resistance region (NDR), but not in the positive-differential-resistance (PDR) region. The microwave shot-noise has been found to be suppressed relative to normal shot-noise in the PDR region, but enhanced in the NDR region. Triple-well RTDs have displayed a much wider NDR region in voltage than conventional single-well RTDs. Several new RTD material systems have been demonstrated including Type-II InAs/AlSb and Type-I GaSb/AlSb, the first of which has yielded excellent properties for high-speed device applications. Studies of highly lattice mismatched InAs/AlSb RTDs on GaAs substrates have proven that the RTD characteristics are insensitive to a high density of dislocations. Finally, these results have been incorporated into the design of RTDs in high-frequency oscillators and high-speed switches. The InGaAs/AlAs RTD has been optimized for application in a quasioptical fundamental-frequency oscillator operating above 200 GHz. The same material system has been used to make a low-power RTD load for heterojunction field-effect and bipolar transistors in high-performance digital integrated circuits.

DESCRIPTORS: (U) \*SEMICONDUCTOR DIODES.

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\*TUNNELING/ELECTRONICS). \*NEGATIVE RESISTANCE CIRCUITS, ADMITTANCE, BIPOLAR TRANSISTORS, DENSITY, DISLOCATIONS, HETEROJUNCTIONS, HIGH DENSITY, HIGH FREQUENCY, INDUCTANCE, INTEGRATED CIRCUITS, LOW POWER, MICROWAVES, OSCILLATORS, SHOT NOISE, SIGNALS, STRUCTURES, SUBSTRATES, SUPERLATTICES, SWITCHES, TRANSPORT, VELOCITY, VOLTAGE.

IDENTIFIERS: (U) Negative differential resistance.

Quantum-well inductance, Suppressed shot noise.

Superlattice tunneling, Type-II heterostructures, Lattice-mismatched growth, Quasioptical oscillator, Negative-resistance load, Resonant tunneling diodes, Quantum wells, Multiple quantum wells.